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AN INVESTIGATION INTO RELATIVE SYNTACTIC DIFFICULTY AND MEMORY STRATEGIES IN PROSE COMPREHENSION

by

JOHN WILFRED RUTLAND

©

A THESIS

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IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE
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FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled "An Investigation into Relative Syntactic Difficulty and Memory Strategies in Prose Comprehension" submitted by John Wilfred Rutland in partial fulfilment of the requirements for the degree of Master of Education.

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ABSTRACT

This study was designed to provide evidence that, good reading comprehenders use a chunking storage strategy when reading prose passages while poor comprehenders store information in a more verbatim form, and that sentences which are difficult to comprehend are stored more verbatim than sentences easy to comprehend. In order to investigate this last question, it was necessary to construct passages in which sentence comprehension difficulty varied. Sentence difficulty was manipulated by varying the syntactic structure of sentences while preserving the same meaning. Thus, relative syntactic difficulty became an additional research question.

The experimental passages were constructed in two forms. The sentences in each of the two forms had the same meaning, sentence-for-sentence, but some of the sentences were written using different syntactic structures. These passages were made into cloze tests. The cloze tests provided measures of syntactic and sentence comprehension difficulty as well as a measure of the subject's reading comprehension ability.

The same passages were also used for the Verbatimness Test. Wh-questions were constructed for the passage sentences which varied in syntactic difficulty. The questions were designed to elicit comprehension answers to these sentences. The answers were scored for degree of verbatimness.

The Graded Word List Test was used to screen 139 Grade Four children. On the basis of this test, a sample of 99 children, with

word-identification abilities of grade four or better, were chosen. These children were randomly divided into groups and administered the cloze tests. The results of the cloze tests were used to identify the relative comprehensibility of passage sentences which preserved meaning but changed syntactically, and to identify the 28 best and 28 poorest comprehenders. These 56 children were then administered the Verbatimness Test. Results from this test were used to decide whether good comprehenders used different storage strategies, and whether sentences which were difficult to comprehend were stored in a more verbatim form.

A number of syntactic structures were found to vary in degree of comprehensibility. However, it was also found, that contextual and lexical factors may interact with syntactic structures to increase or decrease their difficulty.

It was found that good comprehenders produced more verbatimness in their answers to wh-questions. It was argued that the Verbatimness Test was only another form of a short-term recall test, and that the verbatimness finding was consistent with the results of other short-term recall tests. It was further argued that the Verbatimness Test was an inadequate instrument for identifying storage strategies.

Information from sentences which were difficult to comprehend was reproduced more verbatim than information from sentences easy to comprehend. This finding was felt to be consistent with the hypothesis that a chunking storage strategy would require a more thorough comprehension of a sentence than a verbatim storage strategy.

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CHAPTER I

INTRODUCTION AND PROBLEM

While discussing literal paragraph comprehension Karlin writes that "one measure of comprehension (literal paragraph comprehension) is the extent to which the reader sees relationships among ideas ie: how the ideas go together (1971, p. 195)." If one argues, as Karlin does, that literal paragraph comprehension requires the interrelating of component ideas within a passage then the question can be raised as to how the ideas are being stored as the interrelating process proceeds. Clearly the reader does not reread each preceding sentence in order to relate the ideas of each preceding sentence to each newly read succeeding sentence. Rather the ideas from the preceding sentences must be stored in some form. The question can then be asked in what form the ideas are being stored.

Since Miller (1956) developed his chunking theory of memory, there has been some research which attempts to relate his theory to reading or listening comprehension (Sachs, 1967; Jackson, 1970; Bransford & Franks, 1971; Latham, 1973; Pearson, 1974). Miller's theory suggests that an efficient storage strategy requires that the input stimulus first be analysed and then synthesized in a more compact conceptual form. In terms of the storage of information obtained while reading passages this may require that a sentence or sentences be analysed to abstract the meaning of the sentence or sentences and further, that the meaning or meanings be synthesized into a more complex and abbreviated unit (Sachs, 1967; Bransford & Franks, 1971; James, Thompson, and

Baldwin, 1973; Pearson, 1974). Thus the efficient storage strategy may require that sentence comprehension be first accomplished. However if sentence comprehension is too difficult to accomplish then the reader may not be able to use the chunking storage strategy. Smirnov (1973) suggests that, in situations where the input is too difficult to comprehend, a more literal (verbatim) storage strategy may be used. We could conceive of the verbatim storage strategy as follows: Because sentence comprehension is not possible and therefore less meaning can be derived and synthesized, then the stimulus input material must be stored in a less condensed and abbreviated manner. Thus one could hypothesize that in prose passages, sentences which are difficult to comprehend will be stored using a more verbatim storage strategy while sentences which are easy to comprehend will be stored using more of a chunking storage strategy. This study attempts to provide evidence to support this hypothesis.

In order to demonstrate the above mentioned hypothesis, prose passages with sentences which are hard or easy to comprehend are required. One method to make sentences hard or easy is to use syntactic structures which are hard or easy. While many studies exist which have attempted to determine the relative difficulty of different syntactic structures (Coleman & Blumenfeld, 1963; Mehler, 1963; Coleman, 1965; Gough, 1965; Savin & Perchonock, 1965; Coleman, 1966; Slobin, 1966; Epstein, 1967; Schlesinger, 1968; Fagan, 1969; Greenburg, 1970; Michekazu, 1972; Cosens, 1973; Pearson, 1974) almost all of these studies suffer from one or more of the following problems: Either the meaning of the sentences was not held constant as the syntax changed thus confounding syntactic difficulty with semantic difficulty; or the syntactic changes were studied in passages in which many difficult transformations existed - thus confounding the effect of one syntactic change alone; or the syntactic changes were studied in sentences in isolation thus reducing the generalizability of relative syntactic difficulty to prose passages. Therefore, in preparing materials for the investigation of memory strategies, this study attempts to produce materials in which relative syntactic difficulty has been demonstrated without the above mentioned problems.

Finally good and poor comprehenders have been studied in terms of their memory capacities by a number of researchers (Raymond, 1952; Reynolds, 1953; Alwitt, 1963; Rodgers, 1966; Todd & Kessler, 1971; Khemlani, 1974). They have found that good comprehenders appear to have superior memory capacity on a number of recall tasks. One hypothesis which could account for the different capacities of poor and good comprehenders is that the poor comprehenders are using a more verbatim strategy while the good comprehenders are using more of a chunking strategy. This study attempts to provide evidence to support this hypothesis.

I. PURPOSE

The purposes of this study are as follows:

1. To compare the comprehensibility of syntactic structures embedded in sentences in continuous prose in such a manner as to eliminate the influence of semantic changes and the possible cumulative influence of many difficult syntactic structures in one passage.
2. To compare the verbatimness of responses of good and poor comprehenders.

3. To compare the verbatimness of responses elicited by questions to syntactically hard and easy sentences embedded in prose passages.

II. HYPOTHESES

The following null hypotheses were formulated from the purposes of this study.

1. There is no significant difference between the "mean cloze sentence scores" of the two sentences of a sentence pair.

2. There is no significant difference between the "mean verbatim scores" of poor comprehenders and the "mean verbatim scores" of the good comprehenders

   i) when all-responses are scored,
   ii) when no-responses are eliminated, and
   iii) when no-responses and error-responses are eliminated.

3. There is no significant difference between the "mean verbatim scores" obtained by subjects responding to easy syntactic sentences and the "mean verbatim scores" obtained by subjects responding to hard syntactic sentences

   i) when all-responses are scored,
   ii) when no-responses are eliminated, and
   iii) when no-responses and error-responses are eliminated.

III. DEFINITION OF TERMS

SENTENCE A word or group of words bounded on one side by the capital letter of the first word and bounded on the other side by a period, or question mark, or an exclamation mark.

CLOZE PASSAGE A passage of continuous prose in which every fifth word has been deleted and, in its place, an equidistant line has been inserted.

CORRECT INSERTION Those insertions on a cloze passage which are exactly the same as the deleted word. (Spelling changes were not considered as errors.)

"CLOZE SENTENCE SCORE" This score is used as a measure of the comprehensibility of a given sentence in a given passage.

"CLOZE PASSAGE SCORE" This score is a measure of a subject's ability to use literal comprehension on a given passage. It is also a measure of the readability of a given passage.

PASSAGE PAIR Two passages which are equivalent but not identical. They are equivalent in that sentence one in passage A_1 means the same as sentence one in passage A_2, sentence two in passage A_1 means the same as sentence two in passage A_2, etc. The passages are different in that there are one or more syntactic changes between them. That is, sentence two of the passage A_1 may have a different syntactic structure than sentence two of passage A_2, sentence three of passage A_1 may have a different syntactic structure than sentence three of passage A_2, etc.

SENTENCE PAIR Two sentences which have the same meaning but different syntactic structures. One sentence of a sentence pair is inserted into passage A_1 of a passage pair while the other sentence of the sentence pair is inserted into passage A_2 of the passage pair.

VERBATIM This term refers to the degree to which a response sentence is exactly the same word-for-word and in the same serial order as the stimulus sentence.

VERBATIM SCORE This score is a measure of the degree of verbatimness in a response on the Verbatimness Test.

POOR COMPREHENDERS The 14 subjects in each of the groups X and Z who ranked lowest in their "cloze passage scores" obtained on the cloze tests administered.

GOOD COMPREHENDERS The 14 subjects in each of the groups X and Z who ranked highest in their "cloze passage scores" obtained on the cloze tests administered.

CORRECT-RESPONSES Those responses on the Verbatimness Test which were correct in terms of meaning, but not necessarily given verbatim.

ERROR-RESPONSES Those responses on the Verbatimness Test which were incorrect in terms of meaning.

NO-RESPONSES Those responses on the Verbatimness Test in which the subject gave no answer.

ALL-RESPONSES Those responses on the Verbatimness Test which included no-responses, error-responses and correct-responses.

SYNTAX The rules governing the grammatical relations within a sentence.

COMPREHENSION This term refers to the derivation of the literal and/or inferred meaning of a sentence or passage.

TARGET SENTENCE This is one sentence of a sentence pair which, in Part II of this study, the subject is required to recall.

TARGET QUESTION This is a question which refers to the target sentence and is designed to elicit a response to the target sentence.

IV. ASSUMPTIONS

1. It is assumed that the two sentences of a sentence pair have the same meaning.

2. It is assumed that the verbatim score used in this study

reflects the manner in which information is stored in memory in that a higher verbatim score shows a tendency to store information gained from a sentence in a more verbatim form while a lower verbatim score shows a tendency to store information gained from a sentence in a less verbatim form. While any one score may not be sufficient evidence to predict how a sentence is being stored, it is assumed that stable trends of verbatim scores developed over many responses and subjects are indicative of how information is stored.

3. It is assumed that the use of the Reading Tutor machine does not seriously change the subject's normal silent reading process when literal comprehension is required.

V. LIMITATIONS

The following factors are recognized as limitations upon the generalizability of the findings of this study.

1. The responses which were analysed for their verbatinmenss were responses to literal comprehension questions. Thus the verbatimness findings may not be generalizable to other types of comprehension questions.

2. The sentences used in this study to compare syntactic differences were constructed by the author. Thus the readability findings which were derived from these sentences may not be generalizable to the same syntactic structures found in Grade Four basal readers.

VI. SIGNIFICANCE OF THE STUDY

The results of the comprehensibility of the syntactic structures examined in this study should assist the reading teacher to decide which syntactic structures will likely prove difficult for Grade 4 children before they encounter them. The same information should also be useful to those persons preparing or choosing materials for Grade 4 children.

The examination of storage tendencies of Grade 4 children reading for literal comprehension of a short passage should also prove useful to the reading teacher. If it can be shown that poor comprehenders are using inefficient storage strategies while good comprehenders are not using these same storage strategies then one of the problems of poor comprehenders may be identified.

Finally if one storage strategy is discovered to be operating with sentences difficult to comprehend and a different storage strategy is discovered to be operating with easily comprehended sentences then some additional insight may be gained into the role of comprehension in memory.

VII. OVERVIEW OF THE STUDY

Chapter Two will present a review of the literature pertinent to relative syntactic difficulty and to two storage strategies.

Chapter Three will describe the research design, the sample, the test instruments, the pilot study, the collection of the data, the scoring of the data and the analysis of the data.

Chapter Four will report the analysis of the data.

Chapter Five will present the findings, the interpretation of the findings, the conclusions, and implications for further research.

CHAPTER II

REVIEW OF RELATED LITERATURE

The purpose of this chapter is to provide a review of the research relevant to syntactic difficulty. As well this chapter provides a review of two possible storage processes which could be part of a larger comprehension process.

I. RELATIVE SYNTACTIC DIFFICULTY

This section of Chapter Two is divided into two parts. The first part deals with research on the relative difficulty of syntactic structures when a memory task is explicitly required. The second part of this section deals with research on the relative difficulty of syntactic structures when a comprehension task is explicitly required.

1. SYNTACTIC DIFFICULTY AND MEMORY

A great deal of the early syntactic research dealing with relative syntactic difficulty involved the task of memorization as opposed to comprehension. That is, subjects were explicitly asked to memorize a number of sentences for later recall.

Mehler (1963) investigated the effects of the following transformations on memory: kernel (simple active), negative, question, passive, negative question, negative passive, question passive, and negative question passive. He chose eight kernel sentences and applied each transformation to each of the eight kernels producing 64 sentences. Groups of eight of these sentences were presented to 80 undergraduates. Each group of eight sentences was presented over five trials. After each trial subjects were to write the sentences they heard as exactly as possible. Mehler found that certain syntactic structures were more difficult to remember than others and attributed the differences in difficulty to a purely syntactic cause. However, it could be argued that syntactic structures which change meaning as in the case of a negative or question transformation are not more or less difficult because of the syntactic change alone, but because they change meaning. Thus, in many of Mehler's transformational changes, there are two variables - syntactic change and meaning change and his findings are therefore somewhat confounded.

Mehler did, however, study one syntactic structure which may not change meaning - namely the passive transformation. His results show that the addition of a passive transformation to either a kernel, a question, a negative or a negative question makes sentences written with these structures more difficult to recall. His experiment, later replicated by Michekazu (1972) thus shows that sentences written with a passive transformation will be more difficult to recall than the non-passive version.

Savin and Perchonock (1965) attempted to explain Mehler's results by hypothesizing that certain transformations take up more space in memory than others. These authors studied many of the same transformations as did Mehler. They designed a task in which fifty undergraduate subjects listened to a sentence written in one of the transformations being studied and then listened to a series of eight unrelated words. The subject's task was to recall the sentence and then as many of the eight words as possible. Savin and Perchonock found that the different transformations apparently required different amounts of storage space since different amounts of unrelated words could be recalled after each transformation. However this finding again must be questioned since many of the authors' transformational changes not only introduced syntactic changes but also introduced meaning changes. Thus it is not known whether the changes in storage space required were caused by meaning changes and/or syntactic changes except in the case of the passive changes which introduced no change in meaning.

This study by Savin and Perchonock was replicated by Greenberg (1970) with 27 children aged four to nine. Greenberg's findings are essentially the same - that is, that a passive transformation is more difficult to recall than its non-passive version.

Other researchers, (Coleman, 1966; Schlesinger, 1968) have also compared passive and active transformations in recall experiments and again found the active structure easier to recall than the passive structure. Coleman's experiment (1966) is notable largely because his sentences were sampled from existing literature rather than constructed by the experimenter. Thus his results add the strength of external validity to the finding that passive sentences are more difficult to recall than active sentences.

Schlesinger (1968) also used passive sentences sampled from existing literature but used both a recall and a recognition task. He found that passives were more difficult on the recall task but not more difficult in the recognition task. Schlesinger assumed that the recognition task did not involve the encoding process found in the recall task. He argued that it was the encoding process which was making the passive sentences appear to be more difficult in a recall experiment. He further argued that the recall experiment only showed active sentences to be the preferred structure for encoding information either because they were easier to encode or because they were the more frequent structure to use in encoding.

An experiment by James, Thompson and Baldwin (1973) supports Schlesinger's thesis that encoding preferences may have caused more passive sentences to be recalled as actives. Noting that the relative image value of subjects and objects was a strong factor in whether a given noun would be recalled as a subject or object, the researchers constructed active and passive sentences which were controlled for the relative image value of the subjects and objects. They found that passives were more likely to be recalled as actives when the object had high image value and the subject had a low image value but less likely to be recalled as an active when subject of the passive had a high image value and the object low image value. Thus the researchers demonstrated one case where a particular factor in encoding preference accounted for the recall performance. The research quoted above as well as Schlesinger's research suggests that syntactic reasons alone may not explain why a passive sentence is apparently more difficult to recall than its active version.

However the passive-active syntactic change is not the only change which tends to preserve meaning - that is, the meaning of a sentence does not change when the information is written in the active or passive. There are a number of other syntactic forms which can convey the same information.

Coleman (1965, 1966) conducted a series of experiments in which he compared a nominalization structure to its detransformed active verb structure. These two forms can convey the same information. In one of his experiments Coleman (1966) constructed a set of 200 sentences, half of which were nominalizations and half of which were the active verb detransformations. The sentences were placed on a memory drum. Each of 60 students read 100 of these sentences (50 active verb and 50 nominalization sentences) and were told to repeat the sentence immediately after seeing it. The independent measure was the number of trials to the first perfect repetition. Coleman found that of the ten types of nominalizations he studied, six were significantly more difficult to memorize than their active verb versions. Coleman suggested that these six nominalizations were more difficult because of two factors. In four of the six significant differences, an extra clause was created due to the nominalization. In the other two significant differences the nominalization created a longer sentence than the active verb version. One of the four types of nominalizations which created an extra clause is used in this study.

In another experiment Coleman (1965) examined the active verb structure versus its nominalized version. The nominalized sentences were sampled from selections from a university library and rewritten in an active verb form. Each of the 40 sentences were exposed for four seconds to 20 undergraduates. The dependent memory measure was the number of content words correctly reproduced and the number of words correctly reproduced. On both measures nominalized sentences were more difficult to reproduce than their active verb versions.

Epstein (1967) conducted a study in which 96 undergraduates were tested on their ability to recall sentences written in an active form, a passive form, and a nominalized form. Each sentence was 23 words long. Although Epstein's experiment manipulated other variables besides syntax, the author was able to partial out the effects of the syntactic changes described above. Epstein found that there was a significant difference in recall as the syntax of the sentences changed. He found that active verb sentences were recalled better than passive sentences which were recalled better than nominalized sentences.

While most memory and syntax experiments have used sentences in isolation as the stimulus, Coleman (1965) conducted a study which examined sentences in context. The experiment involved four sets of two passages, one of which contained nominalization, passivization and adjectivalization transformations. The other passage of each set was identical to the first except that the nominalized and passivized forms were changed to active verb forms and the adjectivalized form was changed to adjectival or adverbial forms. The sixteen undergraduate subjects were allowed half a second per word to read the passages and instructed to write as exactly as possible the passage they read. Coleman used four dependent measures, one of which - the number of content words recalled - deals with recall. Coleman found that on the simplified version significantly more words were recalled. This experiment shows some syntactic structures, in context as well as in isolation, can be more difficult to recall. However it is not clear from Coleman's experiment which of the three structures (passive, nominalization, adjectivalization) or whether any combination of the structures caused the difficulty in the harder passages.

Foss and Cairns (1970) conducted a study similar in design to Savin and Perchonock's experiment. Foss and Cairns tried to determine whether right branching clause sentences required less room in memory storage than embedded clause sentences. Examples of right branching (1) and embedded clause sentences (2) are provided by Foss and Cairns as follows:

(1) "The lady hired the electrician who fixed the lamp that lit the scene (p. 541)."

(2) "The lamp that the electrician the lady hired fixed lit the scene (p. 541)."

Sentences were written in both syntactic forms and were of three clauses in length. The 36 undergraduate students each listened to 120 sentences, 60 of which were right branching and 60 of which were embedded. Before each sentence either two, four or no words were heard. The subjects were required to recall the words preceding the sentence and as much of the sentence as they could recall. The authors found that significantly more was recalled of the right branching sentence and preceding words than was the case for the embedded sentence and words. This suggests that right branching sentences should be easier to memorize than embedded sentences.

2. SYNTACTIC DIFFICULTY AND COMPREHENSION

In the previous section of this review, relative syntactic difficulty of sentences was determined by measuring recall. There was no measure of whether or not the subjects actually understood the stimulus sentences and it is possible that sentences could be stored in memory with little or no understanding of the sentences (Slobin, 1966, p. 220). Therefore the literature pertaining to relative syntactic difficulty and comprehension will be reviewed.

Gough (1965) investigated whether sentences written in a number of different transformations including the passive transformation were equally hard or easy to comprehend. Gough studied kernel, passive, negative and negative passive transformations. Each sentence was paired with pictures which either were or were not representative of the meaning of the sentences. The task of the 21 undergraduates was to decide whether the picture presented after the sentence was in fact representative of the meaning of the auditorily presented sentence. The dependent measure was the response speed between the offset of the picture and the response of the subject. As with the memory experiments conducted by Mehler and Savin and Perchonock, only the passive transformation results can be accepted since the negative transformation results are confounded by meaning change. Gough found that the passivized sentences required a longer response time and therefore were more difficult to comprehend than their active versions.

Slobin (1966) replicated Gough's experiment with some changes in the passivized and active sentences. As in Gough's experiment the subjects in Slobin's study listened to a sentence and then were presented with a picture which either reflected the meaning of the sentence or did not. The subjects were to make a positive or negative response as to whether the picture reflected the sentence's meaning. The subjects were 80 males and females from the undergraduate, and kindergarten, grades 2, 4, and 6 level. The latency of response was the dependent measure. With respect to passivized sentences, Slobin's experiment differed from Gough's in that Slobin used two types of kernel sentences and thus two types of passives. In the first type of kernel sentence the object was not logically capable of being the subject of the verb as in the following example:

"The little boy kicked the little flower."

Obviously "the flower" could not logically be the logical subject of the verb since rarely do we have the case of a flower kicking a little boy. In the other type of kernel sentence the object could logically serve as the logical subject of the verb as in the following example:

"The little boy kicked the little girl."

There are undoubtedly many cases of "little girls" kicking little boys. Slobin found that only passivized versions of kernel sentences of the second type were more difficult to comprehend (took longer to respond to). This suggests that only passivized sentences, in which both the subject and the object can serve as the logical subject, will be more difficult than their active version. The cause of the comprehension difficulty of passive sentences then cannot be purely syntactic but rather an interaction between syntactic and semantic factors.

In the previous section of this review, some nominalizations were shown to be more difficult to recall than their active verb versions. Coleman and Blumenfeld (1963) designed an experiment to determine whether nominalizations were more difficult to comprehend than their active verb versions. The authors selected two passages and a number of sentences from library books. These passages and sentences contained a large number of nominalizations. Simplified versions of these passages and sentences were constructed by changing the nominalizations to active verbs. This was the only change made between forms of passages and sentences. The passages and sentences were then made into five forms of a cloze test so that a score could be obtained on each word. The results of the cloze tests showed that nominalizations were significantly more difficult to comprehend than their active verb versions.

In another experiment Coleman (1965) compared the comprehensibility of nominalization, passivization, and adjectivalization structures with their active verb and adjectival and adverbial detransformations. Two passages were presented to 48 undergraduates. One passage was written in a simplified form while the other contained the adjectivalization, nominalization and passivization structures. Subjects were asked to read one of the forms and answer multiple choice comprehension questions on the passage. Dependent measures were the number of correct choices made on the multiple choice questions and the length of time required to read the passage. Coleman found significant differences in the multiple choice responses. Readers of the simplified passage obtained higher scores on the multiple choice questions than did readers who read the nominalized, passivized and adjectivalized versions. However it is not clear which of the structures or whether all of the structures were causing the difficulty in comprehension.

On an experiment using only nominalization versus active verb structures Coleman (1965) was unable to obtain a significant difference between passages on a multiple choice test. However in this experiment the subjects were also requested to memorize the sentences which may have reduced the effect of the syntactic changes on the multiple choice test. Although the difference between the readers of the nominalized version and the readers of the active verb version was not significant for the multiple choice test, the direction of difference suggested that the nominalized sentences were more difficult to comprehend.

Coleman (1966) used a cloze test to determine the relative comprehension difficulty of embedded clause sentences versus right branching clause sentences. Twenty embedded clause sentences were constructed and then rewritten as right-branching clause sentences. Each sentence contained two clauses - a main clause and an embedded or right branching clause. The 40 undergraduate subjects each read twenty of the 40 sentences and then completed one of five forms of a cloze test on the sentences that they had read. Coleman found a significant difference between the number of correct insertions in embedded clause sentences and right-branching clause sentences. Fewer insertions were made for the embedded clause sentences,suggesting that this form may be more difficult to comprehend than the right branching form.

Schlesinger (1968) conducted two experiments with adults in which he investigated the readability of different levels of self embedding. The materials consisted of constructed sentences with two variables operating - length of the embedding and degree of embedding. Embeddings were either long or short and either one, two or three multiple embeddings, or no embeddings at all. Although it is not clear from Schlesinger's explanation,it would appear that in the no embedding condition the clauses became right branching. Some of the sentences constructed contained logical inconsistencies and it was the subject's task in the first experiment to discover these inconsistencies when reading the sentences. Thus the task was essentially a reading comprehension task. In the second experiment a comprehension test was used and thus the second experiment is therefore also a comprehension task. Schlesinger found that only when the three multiple embedding level was compared to the no multiple embedding level (right branching) could a significant difference be found. The direction of the difference showed the right branching structure to be easier to comprehend. It should be remembered that a sentence with three embedded clauses is extremely rare in literature.

It is difficult to compare the results of Schlesinger's experiment to the embedded right branching experiment of Coleman. Coleman used only one embedded clause while Schlesinger used three. Secondly only Schlesinger's comparison of three embedded sentences to no embedded sentences can be compared to Coleman's experiment since the 1 and 2 embedded sentence conditions did not have a correspondingly equal number of right branchings. However, when only the three embeddings is compared to no embeddings (which is perhaps equivalent to three right branching clauses), then the results agree with Coleman's results.

Most of the studies reviewed to this date have dealt with only one or a few transformations. As well few of the studies have used sentences or passages sampled from the existing literature. Those studies which have sampled sentences or passages from existing literature have sampled adult literature. Fagan's study (1969) is an answer to these limitations.

Fagan (1969) sampled three sets of stories from three approved

Grade Four reading series. The first set of stories was unaltered. The second set of stories was rewritten in the following manner: twelve of the twenty sentences from a passage were rewritten in one transformation class while the remaining eight sentences were rewritten in the other three transformational classes. The final set of stories was rewritten with only one sentence altered. This sentence was altered four times, each alteration being from a different transformational class. As well, the altered sentence was in one of three different positions, either near the beginning of the passage, near the middle or near the end of the passage. Each of the stories from the three sets of stories was made into five forms of a cloze test. These cloze tests were administered to a large number of grade four, five, and six students. From the analysis of the cloze results,Fagan was able to rank the transformations found in the stories in a hierarchy from most difficult to least difficult to comprehend for each of the three grade levels. The value of this study to the writer or teacher lies in the scope of the study. Virtually all the common transformations and most of the uncommon transformations found in reading texts at the middle elementary level were ranked as to difficulty in Fagan's study.

However there are some reservations necessary in interpreting Fagan's results. The major problem stems from the author's failure to control meaning. In the first set of stories no control at all was placed on meaning. If a particular transformation was found difficult one does not know whether that transformation proved difficult for syntactic or semantic reasons. In the second and third sets of stories there is a partial control of meaning but still inadequate to be confident that syntactic structure was the sole cause of sentence difficulty as opposed to semantic causes. For example, the following sentences appear in one of the third sets of stories.

> "Daedalus was clever and escaped from the high tower. It is surprising that Daedalus did not escape from the island." (p. 308)

In another story of the same set of stories the above quoted sentences are rewritten as:

> "Because he was so clever, Daedalus escaped from the tower. Daedalus could not escape from the island." (p. 307)

In the first example the idea of surprising is introduced in the second sentence. In the second example the idea of surprising *may* possibly be inferred but certainly it is not as explicitly stated in the second example as it is in the first.

Because sentence meaning was not held constant then Fagan's findings must be accepted with some caution. It may well be, given present methods of measuring relative syntactic difficulty, that it is impossible to measure the relative difficulty of certain syntactic structures with meaning held constant. For instance, how could one hold meaning constant while comparing a negative and a question transformation or a contraction and a gerundive. In the first case the very introduction of the transformation changes the sentence's meaning while in the second case the contraction could not be rewritten as a gerundive. Therefore, given present experimental methodology, Fagan's findings, with respect to those syntactic structure changes which change meaning, are as definitive as possible. However for those findings, on syntactic structure changes which do not change meaning, the results are confounded by unnecessary meaning changes and are for that reason somewhat limited.

Fagan's findings on the relative difficulty of syntactic structures which, when changed, preserve meaning are listed below. Again it must be cautioned that in Fagan's study meaning changes did occur as he changed syntactic structures and the findings are therefore limited. Fagan found that, the verb + complement and the that + s as object structures were easier to comprehend than the reflexive-intensive structure; that the infinitive of purpose structure was easier than the ing nominalization of purpose, that the adverb position shift was easier than the adverb replacement deletion; that an adjective structure was easier than the relative clause structure; and finally that the intact form of a contraction was more difficult than the contraction. Finally it should be made plain that it is the author's assumption, and not Fagan's, that the syntactic structures compared above can express the same meaning.

Many of the transformations which Fagan investigated in his study have received very little attention. However Pearson (1974) has contributed information concerning the comprehensibility of the adjective vs its relative clause comparison. Pearson constructed sets of sentences. The sentences each had the same meaning but the noun modifiers in each sentence were in a different syntactic form. In one sentence the two modifiers were adjectives. In another sentence one of the modifiers was in a relative clause. In the third sentence one of the noun modifiers was placed in a separate sentence and in the fourth sentence both modifiers were in separate sentences.

The subjects were shown a question which concerned either the noun or the noun modifier. They were told to rate the sentences as to which gave the clearest and best answer to the questions. Pearson found that as the sentence became more compact (that is, as the noun modifiers became more embedded) the preference for that form increased. Subjects felt that the modifiers in the adjective structure were clearest and in the clause structure less clear. If preference in this situation can be equated with comprehensibility, then Pearson's findings lend support to Fagan's finding that adjectives are more comprehensible than their relative clause detransformations.

Cosens(1973) conducted a study similar to Fagan's study (1969). It differed in that it concentrated on twelve deletion transformations at the Grade One and Two level. She reconstructed passages taken from basal reading texts. Each passage contained six intact and six deletion produced transformation sentences. These passages were then made into cloze tests and administered to 320 children. For the Grade One children oral responses to the cloze tests were accepted. Cosens found that the that + s as object deletion was one of the easiest deletion transformations at the Grade One and Two level. It was also easier than its intact form at both grade levels. The that + s as object intact form was one of the easier structures of all structures compared at the Grade I level and ranked about middle at the Grade Two level. Since that + s as object was not found to be the most difficult of transformations at the Grade One and Two level and the reflexive-intensive structure was found by Fagan (1969) to be the most difficult structure from among many structures at the

TABLE 2.1

SUMMARY OF SYNTACTIC STRUCTURES WHICH ARE RELATIVELY EASY OR HARD TO COMPREHEND AND/OR MEMORIZE AND WHICH PRESERVE MEANING

SYNTACTIC DESCRIPTORS		STUDIES WHICH SUPPORT THIS DIFFERENCE	
EASY	HARD	FOR RECALL TASKS	FOR COMPREHENSION TASKS
Simple Active	Passive	Mehler (1963) Savin & Perchonock (1965) Greenburg (1970) Michekazu (1972) Epstein (1967) Schlesinger (1968)[++]	Gough (1965) Slobin (1966)[+]
Active Verb	Nominalization of Active Verb	Coleman (1964, 1966) Epstein (1967)	Coleman & Blumenfield (1963) Coleman (1964)
Right Branching Clause	Embedded Clause	Foss & Cairns (1970)	Coleman (1966) Schlesinger (1968)
Verb + Complement That + S as Object	Reflexive-Intensive		Fagan (1969) Cosens (1973)
Infinitive of Purpose	Ing Nominalization of Purpose		Fagan (1969)
Adverb Position Shift	Adverb Replacement Deletion		"
Intact Form	Contraction		"
Adjective	Relative Clause		" Pearson (1974)

[+] Slobin (1966) found only some passives more difficult to comprehend.

[++] Schlesinger (1968) found passives more difficult on recall but not more difficult on a recognition task.

Grade Four level, Cosens' study offers indirect evidence that the that + s as object structure is easier to comprehend than the reflexive-intensive structure.

SUMMARY

This section of the review of literature has examined the research pertinent to the relative difficulty of different syntactic structures. A number of syntactic structures have been found to be more difficult than others even when meaning is held constant. It was also asserted that only certain syntactic structures can preserve meaning as one structure is replaced by the other. Table 2.1 summarizes the syntactic forms which are more or less easy to memorize and/or comprehend and which preserve meaning. The table should be read across - that is, only those structures which are directly across from each other preserve meaning.

II. MEMORY PROCESSES IN COMPREHENSION

If we assume that literal paragraph comprehension requires the interrelating of ideas found in the sentences of paragraphs and if one assumes that the information from the sentences of a paragraph are being stored in memory in order to facilitate the interrelating process, then one can ask the question as to how the information from sentences in a paragraph are stored.

Miller's (1956) chunking theory is one strategy which could be used in the comprehension process. From an analysis of a number of experiments, Miller hypothesized that short-term memory was capable of storing only seven plus or minus two units of information. Yet the human mind obviously held a tremendous amount more than this over longer periods of time.

Miller sought to resolve this paradox with his chunking theory. Basic to his theory is the distinction between the unit of storage and the amount of information stored. While only seven plus or minus two units of information can be stored, the unit itself can handle larger or smaller amounts of information. By recoding a relatively large amount of information into a single chunk or unit, more information can be stored. The recoding process thus involves the reorganization of many bits of information into smaller more compact units.

One of Miller's examples illustrates this reorganization process. He noted that persons learning Morse Code first analysed each sound as an individual dit or dah. As practice increased, the discrete sounds were organized into letters and only the letters were stored. Again as practice increased the learner again increased the storage unit to the word level. Thus instead of storing many discrete sounds for each word, the more practised operator only needed to store a relatively small number of words. Miller concluded that "recoding is an extremely powerful weapon for increasing the amount of information that we can deal with. In one form or another we use recoding constantly in our daily behavior (p. 95)."

There are a number of important points about efficient storage which Miller makes. One point is that information is not stored in some template representation of the perceived event. Rather it is reorganized, the relationships abstracted, and it is this which is stored. This concept falls in line with Bartlett's reconstruction theory of memory (1932). Bartlett concluded from his studies that what is remembered from a picture story, or event is some general rule which, when recall is required, interacts with the subject's past experience to produce what the subject feels is accurate recall. There is some experimental evidence which does suggest that the chunking hypothesis might be part of efficient reading comprehension.

Jackson (1970) attempted to find the relationship between the ability to recall words from a free recall test and reading comprehension. After testing 150 Grade Six children on a number of free recall tests and cloze comprehension tests, Jackson found that the number of words recalled on a semantically organized free recall list correlates positively and significantly with comprehension ability. As well, Jackson found that the measure of clustering in the same free recall test correlated positively and significantly with comprehension ability. Finally Jackson found that as the amount of clustering increased on the semantically organized free recall test, so also did the amount of total recall increase. These findings suggest that the efficient comprehender is a person who does some reorganizing in some memory tasks and that this reorganizing improves his memory capacity.

Latham (1973) conducted a somewhat similar study. Latham administered a semantically organized free recall list to 609 undergraduate students. The responses were scored using two measures. One measure assessed the degree of clustering found in the response while the other measure assessed the degree of serial order recall. Latham found significant positive correlations between the ability to cluster in free recall and comprehension ability. He also found significant negative correlations between the ability to organize recall in a serial order and comprehension ability. In other words the good comprehenders appeared to be using some reorganizing in their memory task while the poorer comprehenders appeared to be attempting to recall the words in the exact order in which the words were given.

When we examine the reorganizing process in the free recall tests we can see that this process requires a particular type of comprehension. The words presented on both Jackson's semantic recall test and Latham's recall test came from four semantic categories. But when these words were presented to the subjects, they were presented in a random order. Those subjects who were demonstrating high cluster scores then must have searched through the randomly presented words to find the relationships that existed between the words. The attempt to find the relationship between the words was a type of comprehension. For this reason we might assume that the chunking strategy requires some comprehension of the stimulus material.

Both Jackson's and Latham's studies offer some experimental validation to Miller's theory as applied to the reading process. But since the organizing strategies of the subjects were identified by means of a memory test as opposed to a reading test itself we really are not certain that reorganizing and clustering are going on in the reading act itself. Only the strong correlations between the clustering scores and the reading comprehension scores offer any proof that efficient reading comprehension requires a degree of chunking in memory.

However there is other evidence which would suggest that chunking in memory is a part of efficient comprehension. Implicit in the chunking theory is the notion that some information from the original stimulus is not retained in memory. For instance the dit's and dah's of an efficient Morse code comprehender are not retained whereas the words or phrases (more meaningful units) are retained in order that the words or phrases may be transcribed. Given a passage of continuous prose, what type of information is remembered by the efficient comprehender?

In order to answer this question Sachs (1967) conducted a study which examined what types of information were accessible to memory over different spans of time. She presented 24 passages to 96 undergraduate students. In each passage a sentence was inserted. The inserted sentence was constructed so that the surrounding context would aid as little as possible in obtaining the meaning of the inserted sentence. The subjects listened to the passage up to the inserted sentence and continued to listen to the passage for either 0, 60 or 120 syllables after the inserted sentence. When the passage was stopped (ie. at either 0, 60, or 120 syllables) the subjects were presented with test sentences which were either similar or identical to the inserted sentence. The sentences which were similar changed meaning by interchanging a subject for an object, or inserting a negative or substituting a word found elsewhere in the passage. The similar sentences also could change their syntactic form. Thus a number of semantic as well as syntactic changes were made between the inserted and test sentence. The subjects were instructed to decide whether the test sentence was the same one they had heard in the passage.

The results of Sachs' experiment show that while changes in meaning were perceived at above a chance level up to and including 120 syllables after the offset of the inserted sentence, changes in syntax could only be perceived at above chance levels when there was no delay between offset of the inserted sentence and the test sentence. This experiment suggests that semantic information, not syntactic information, is stored in a comprehension task. Because the subjects used were undergraduate students and thus relatively good comprehenders, one could assume that the strategies used by these subjects are efficient storage strategies.

The results of Sachs' experiment are indirectly confirmed by an experiment by Jarvella (1971). Using 24 undergraduates as subjects, he tried to determine what syntactic unit was retrievable from memory. Jarvella constructed sentences such that each pair of sentences ended with the same sequence of words but that in each member of the pair, the sequence of words fell into a different syntactic arrangement. To be more specific, in each pair of sentences there were three clauses making up two sentences. In one member of the pair the arrangement was two sentences with the first sentence being one clause and the second sentence being two clauses - one main and one subordinate. In the other member of the pair the arrangement was two sentences with the first sentence being two clauses and the second sentence being only one clause. The 16 pairs of sentences were embedded in two passages of continuous prose. The passages were read to the subjects. A pause was placed after the inserted sentences. The subjects were requested to write as exactly as possible as much as they could remember of the preceding passage. They were also told that their comprehension of the passage would be tested although this instruction could not have had too great an effect towards changing the task from a memory to a comprehension task. The responses of the subjects were scored on a number of verbatim recall measures. Jarvella found significant differences between different members of a pair. He found that the immediately heard clause and immediately heard sentence were recalled significantly better than other preceding syntactic units. Furthermore the immediately heard clause and sentence were recalled sufficiently well to be considered by Jarvella as the only accessible syntactic units in short term memory. This experiment confirmed Jarvella's notion that syntactic information is held in short term memory only until the sentence has been comprehended and then it is forgotten.

Perhaps the most compelling evidence supporting the chunking hypothesis in efficient reading comprehension is afforded by the experiments by Bransford and Franks (1971). Bransford and Franks attempted to show that information received from a number of sentences which relate to a semantic theme are grouped semantically around that theme and stored in that manner. The researchers created a number of complex sentences which could be broken down into four smaller sentences. These were called Ones. The One sentences could be combined into Two sentences, Three sentences or back to the original Four sentences (the original complex sentence). During acquisition, the undergraduate subjects were presented with sentences of level One, Two and Three. These sentences were systematically ordered so that no two sentences from the same original complex sentence were consecutive. In other words sentences relating to the same theme were spread over the entire acquisition list. Thus the researchers created a situation where regrouping around a common theme was more than normally difficult. After the acquisition stage was completed,the subjects were presented with a recognition task of which they had not previously been warned. The recognition task consisted of identifying, from a list of sentences, the sentences which they thought they had heard on the acquisition list of sentences. They were also to give a confidence rating on their decision. The recognition list consisted of some old sentences of the One, Two and Three level and some new sentences again taken from the original complex sentences of levels One, Two, Three and Four. As well, in some of the experiments,the researchers added sentences which contained ideas taken from a number of different themes. The results of the experiments provide strong support for the chunking hypothesis. Bransford and Franks found that regardless of whether they had actually heard the sentence, the subjects' confidence about whether they had heard or not heard the sentence increased as the semantic cohesion of the sentence increased. The subjects rated Four sentences as highest and One sentences as lower as to whether they had heard the sentence. The lowest rating was given to the crossover sentences which amalgamated ideas from different themes. From this experiment it would appear that subjects were looking for relations between sentences (a type of comprehension) and that, when they found them, they stored the integrated information as a unit. The original syntactic information of the sentences was not stored and likely was used only in the initial decoding of the sentences. Again since undergraduate students were used as subjects,one could infer that the process described above is one which efficient reading comprehenders use.

The results of this experiment were largely confirmed by Singer and Rosenberg's (1973) replication experiment. They conclude that "the human listener is portrayed as a very active processor of linguistic input, not only integrating, but also pruning or emphasizing portions of the received input (p. 283)." This hypothesis has been further tested by Bransford and Franks (1972) again with adults and by Paris and Carter (1973) and Paris and Mahoney (1974) with children. In each study the results showed that subjects were actively integrating the stimulus input into a more wholistic unit.

Given the five experiments just reported,it would appear that once a sentence has been comprehended,syntactic information is lost. It would appear as well that the type of information which is retained is concerned with the meaning of a sentence or group of sentences. Thus it seems reasonable that the information presented in a sentence is stored in a reorganized semantic chunk.

An alternate storage strategy is one in which, most of the information present in a sentence, is in fact stored. In other words the sentence is stored verbatim. Few researchers appear to have considered this strategy. One researcher who has investigated verbatim storage is Smirnov (1973). Smirnov suggests that

> The school demands from the students a memorization to a considerable degree complete, exact, stable and sequential. This demand in many cases, especially in younger school children is distorted in the mind of the student into the necessity of memorizing literally. (p. 46)

As well Smirnov suggests that

> In lower grades, the material to be memorized is of small volume and compactly written, giving little opportunity to retell it 'in one's own words,' and the pupils at this age are not sufficiently able to tell it 'in their own words' thus forcing the student towards literal retention. (p. 46)

Thus Smirnov has isolated three reasons which might move a child towards a verbatim storage strategy. In terms of environmental factors, the child may perceive the school as demanding a verbatim task. In terms of the stimulus materials, Smirnov suggests that their compactness and shortness may not allow the child to retell it in his own words. It might well be also that, given a sufficiently short task, the task may fall within the bounds of verbatim memory thus eliminating any need to use alternate strategies. Finally Smirnov isolates the language capacity of the child itself as a factor in forcing a child to use verbatim memory.

From Latham's finding that subjects who used a serial order recall strategy (a verbatim strategy) generally produced poorer comprehension results, it would seem evident that verbatim storage is a less efficient strategy than the chunking strategy. As well it would seem evident from the positive correlation between clustering and comprehension on both Jackson's and Latham's study that unless a chunking strategy is used then comprehension will suffer. Thus it would appear that a verbatim storage strategy is an inferior strategy and possibly a strategy used by poor comprehenders.

It would seem reasonable that a verbatim storage process is less efficient because it clogs up the memory with needless information. For this reason some of the information thus stored must be lost due to the overcrowding of the memory. As a result information from the initial portion of passage would not be related to information from a succeeding part of a passage - not because either part was not comprehended but because the information from the initial portion was forgotten.

One further point should be made here. The chunking storage process apparently requires a sentence to be comprehended. Piaget (1968) noted the relation between comprehension and memory. In a number of experiments, only some of which are reported, children were presented with visual arrays. They were then asked to reproduce these, over a period of up to six months. When short term recall was demanded, errors were in line with the child's characteristic mental operations. After six months, Piaget noted changes in recall which were characteristic with changes in the child's mental operations. Since the array had not been seen for six months, then the changes must have been due to the fact that the child must have been reconstructing the array in terms of his new mental operations. These studies suggest that, what is remembered and what is recalled, is dependent upon how a child comprehends an event.

Both Jenkins (1973) and Smirnov (1973) have conducted similar studies on the recall of word lists in which different instructions have been given to different groups studying the lists. To one group a spelling task was assigned while to another group a recall task was assigned. Finally to a third group an associational task was assigned. Both researchers found that the group assigned the associational task recalled the words from the list as well or better than the recall task group. Both studies suggest that where attention is drawn to meaning relations of words, recall improves.

Mistler-Lachman (1974) conducted a study similar to Jenkin's and to Smirnov's study. Mistler-Lachman's study differed in that the association of sentences were studied instead of words. Mistler-Lachman found that when undergraduate subjects used different comprehension strategies on the sentences, then different levels of recall were obtained. Specifically, the comprehension tasks requiring the greatest depth of comprehension produced the greatest recall of sentences. Freisman and Tuxworth (1974) conducted a study similar to Mistler-Lachman's study and obtained similar results. If depth of processing affects recall, it would seem reasonable that if a sentence cannot be comprehended then it should be recalled less well than a sentence which can be comprehended.

If in fact comprehension of a passage or sentence in a passage is not possible and recall is demanded, what strategy will the reader use?

Smirnov suggests a child resorts to "mechanical memorizing" when his attempt to comprehend the material has failed (1973, p. 115). Smirnov adds that

> even when the schoolchild does not make attempts to understand the material, he is not prompted to this by characteristics of his memory but by other causes, primarily by the difficulty of understanding itself. From experience he knows that he often succeeds in understanding only after considerable effort and time. This evokes in him a negative attitude. Therefore the next time he does not understand at once, he takes a different, mechanical, approach to memorizing. The question of the suitability of this approach is decided not by its correlation with meaningful memorizing, but by comparison with the difficulties of comprehension (p. 115).

Smirnov suggests then that, when material cannot be understood, it is stored in a more verbatim form.

It would appear that at least two types of storage strategies can be used in a reading process. One strategy requires the material to be comprehended and stored in a more cohesive semantic whole. This is the efficient storage method. The alternate method - the less efficient method - is verbatim storage, where sufficient information of an input is stored to enable the verbal output to be a relatively mirror like reflection of the input.

Rather than consider the chunking vs verbatim strategies as two separate and distinct processes, it might be more accurate to conceive of them as the two ends of a continuum. As one proceeds from the chunking process end to the verbatim process end one does less comprehending, and less reorganizing. As one approaches the verbatim end of the continuum, more surface string information is stored. This does not mean that some comprehending and regrouping has not been part of an apparently verbatim recall task. It does mean that less comprehending and regrouping has taken place.

III. SUMMARY

The first part of this chapter reviewed the literature relevant to the relative difficulty of different syntactic structures in memorization and comprehension tasks. A table was constructed which showed the syntactic structures which preserved meaning and which were more or less difficult.

The second part of this chapter reviewed the literature relevant to memory processes in comprehension of written materials. Two strategies for recall were identified and compared. The chunking strategy was considered to be a process wherein an event was comprehended and the information from the comprehended event was reorganized into some more compact semantic unit and it was the semantic unit which was stored. The verbatim strategy was considered to be a storage process where more uncomprehended and less reorganized information from the event was stored. The factors which might initiate the verbatim storage strategy were outlined.

CHAPTER III

THE EXPERIMENTAL DESIGN

INTRODUCTION

This chapter explains and describes the experimental design of the study, the sample, the testing instruments, the pilot study, the data collection and scoring and finally the statistical treatment of the data.

I. THE DESIGN OF THE STUDY

The purposes of this study were, to compare the comprehensibility of a number of syntactic forms, to compare the verbatimness of responses of good and poor comprehenders and to compare the verbatimness of responses elicited by questions to syntactically hard and easy sentences.

For Part I of this study ninety-nine Grade Four children were chosen on the basis of their word identification ability as measured by The Graded Word List Test (LaPray & Ross, 1969). The children were randomly assigned to groups X and Z (N = 50 and 49 respectively). Group X and Z were then randomly subdivided into five equal groups. Each subgroup was administered four cloze tests.

The cloze tests were made from the eight passages used in the Verbatimness Test. Each passage was made into five different cloze forms - that is each cloze form deleted a different word in the following manner: cloze test (1) deleted the 1st, 6th and 11th word; cloze test (2) deleted the 2nd, 7th and 12th word, etc. Thus with eight passages and five cloze tests of each passage, there were forty cloze tests in all.

The subgroups of X were administered one of the cloze tests of Passages A_1, B_2, C_1 and D_2 while the subgroups of Z were administered one of the cloze tests of Passages A_2, B_1, C_2 and D_1. The assignment of cloze tests to groups was systematically varied. The order of presentation of cloze tests was also systematically varied. Table 3.1 shows the assignment of cloze tests to groups and the presentation order.

TABLE 3.1

ASSIGNMENT OF CLOZE TESTS TO GROUPS

	GROUPS									
	X_1	X_2	X_3	X_4	X_5	Z_1	Z_2	Z_3	Z_4	Z_5
PASSAGES	A_1(1)	B_2(3)	C_1(5)	D_2(2)	A_1(5)	A_2(1)	B_1(3)	C_2(5)	D_1(2)	A_2(5)
	B_2(2)	C_1(4)	D_2(1)	A_1(4)	B_2(1)	B_1(2)	C_2(4)	D_1(1)	A_2(4)	B_1(1)
	C_1(3)	D_2(5)	A_1(3)	B_2(5)	C_1(2)	C_2(3)	D_1(5)	A_2(3)	B_1(5)	C_2(2)
	D_2(4)	A_1(2)	B_2(4)	C_1(1)	D_2(3)	D_1(4)	A_2(2)	B_1(4)	C_2(1)	D_1(3)

The bracketted numeral beside the passage designator indicates the form of the cloze test (ie. A_1(1) means Passage A_1 made into the cloze test which deletes the first, sixth and eleventh word, etc.). The letters at the top of the table indicate the group and the numeral beside the letter indicates the subgroup. To determine the presentation order, read down in any group column.

The cloze tests were inserted in their presentation order into a manilla envelope before the testing period. A sample of the instructions used for the cloze testing sessions as well as a sample of two of the cloze tests used in this study are shown in Appendix A.

The completed cloze tests were analyzed to determine the relative difficulty of different syntactic structures. The "mean sentence cloze scores" were used for this analysis.

The completed cloze tests were also analyzed in order to rank the ninety-six subjects who completed the cloze test. The ninety-six subjects were ranked in terms of their comprehension ability as measured by the cloze tests. The total "passage cloze scores" were used for this analysis. The top fourteen children of group X and the bottom fourteen children of group X were chosen for Part II of this study. These children became groups GX and PX respectively. The same selection procedure was carried out for group Z producing groups GZ and PZ.

In Part II of this study the groups GX, PX, GZ and PZ were administered the Verbatimness Test. Groups GX and PX were administered Passages A_1, B_2, C_1 and D_2 from the Verbatimness Test while groups GZ and PZ were administered Passages A_2, B_1, C_2 and D_1.

The order of passage presentation was systematically varied. The order of presentation of questions was systematically varied as well. Since the children responded orally to the questions, a tape recorder was used to check on the researchers transcription of the responses. Appendix B shows a sample of the instructions used with the Verbatimness Test as well as the Verbatimness Test passages and questions. The verbatimness Test was analyzed with respect to Hypothesis II and III.

II. SAMPLE

Six Grade Four classes in four schools from the Edmonton Public

School System were chosen for this study. The enrollment from these six classes totalled 139. The four schools were located in the north central area of Edmonton. Students attending these schools came from predominantly middle and lower middle class homes.

It was decided to use grade four students because few studies have dealt with the readability of sentences with different syntactic structures at this grade level (Fagan, 1969) and few studies have examined the memory strategies used in the comprehension of prose passages at this grade level.

The total population was screened with The Graded Word List Test (LaPray & Ross, 1969). Those children who scored below the grade four level were eliminated leaving ninety-nine children for Part I of this study. Table 3.2 shows the dispersion of scores for the ninety-nine children on The Graded Word List.

TABLE 3.2

DISPERSION OF WORD IDENTIFICATION SCORES OBTAINED BY CHILDREN IN PART I OF THIS STUDY ON THE GRADED WORD LIST

OBTAINED GRADE LEVEL	NUMBER OF CHILDREN
4	38
5	47
6	7
7	6
10	1

Of the thirty-five children eliminated, seven of these scored at the grade two level while twenty-eight scored at the grade three level. Five children were absent during the testing period and were eliminated for this reason.

In Part II of this study fifty-six students, comprising four groups, were chosen on the basis of their comprehension scores as measured by the cloze tests of Part I. Table 3.3 shows the "mean cloze passage scores" and standard deviations of each of the four groups.

TABLE 3.3

SUMMARY OF PASSAGE MEANS AND STANDARD DEVIATIONS OBTAINED ON THE CLOZE TESTS BY THE FOUR GROUPS OF PART II*

	GX	PX	GZ	PZ
MEAN	226.29	131.21	225.29	131.71
S.D.	18.24	18.61	21.12	18.06

*N = 56

In order to compare the verbatimness of responses of good and poor comprehenders, it is necessary to have samples of good and poor comprehenders. The mean differences of GX vs PX and GZ vs PZ are both highly significant (T = 13.650, p = 0.0; T = 12.60, p = 0.0 respectively). Therefore, we can assume that in Part II of this study the good comprehenders are significantly better on literal or inferred comprehension tasks than the poor comprehenders as measured by the cloze tests used in this study.

In order to compare the verbatimness of children's responses to syntactically hard and easy sentences without the findings being confounded by group differences in comprehension ability, it is necessary to have groups which are equal in their comprehension ability.

The groups used to compare the verbatimness of children's responses to syntactically hard and easy sentences were groups (GX & PX) and groups (GZ & PZ). In other words two larger groups of 28 children each were formed from the four subgroups. Table 3.4 shows the "mean cloze passage scores" and standard deviations obtained by these larger groups on the cloze tests.

TABLE 3.4

SUMMARY OF MEAN PASSAGE SCORES AND STANDARD DEVIATIONS OBTAINED ON THE CLOZE TESTS BY THE TWO GROUPS (GX & PX) AND (GZ & PZ)*

	GX & PX	GZ & PZ
MEAN	178.75	178.50
S.D.	51.68	51.40

*N = 56

The difference between the means of group (GX & PX) and group (GZ & PZ) is not significant (T = .018, p = .49288). Therefore one can safely assume that the group (GX & PX) does not differ from the group (GZ & PZ) in their ability to use literal and inferred comprehension.

III. TEST INSTRUMENTS

Three test instruments were used in this study. The latter two, the cloze tests and the Verbatimness Test, were constructed by the author.

1. THE GRADED WORD LIST

This test, constructed by LaPray and Ross (1969) was designed as an instrument to provide a quick assessment of a child's reading grade level and some information on his word identification strategies.

The test is comprised of thirteen lists of ten words each. The words were chosen randomly from basal reader glossaries and the Thorndike List. The test authors reported some shifting of words from one list to another after examining the responses of the pupils which they tested. A sample test and instructions are shown in Appendix C.

Validity and Reliability. This test is designed to measure up to what grade level the child can easily identify (pronounce) words. Since the words which appear on the test were chosen from basal reader glossaries and the Thorndike List, the words are in fact ones which would likely be presented to children at different grade levels.

The test authors report no reliability analysis on their test other than to say that the reading grade placement results of 100 administrations of the test agreed on all but four cases with the classroom teachers' assessment of the child's reading grade placement.

As part of a study conducted by Muise (in print) the Schonell Graded Word Reading Test was administered along with The Graded Word List to 68 students of grade six. The two tests correlated .93.

2. VERBATIMNESS TEST

The Verbatimness Test was constructed by the researcher. Eight passages were developed for this test. Passages A_1 and A_2 were entirely constructed by the author. Passages B_1 to D_2 were constructed by adding one sentence, constructed by the researcher, to stories sampled from grade four basal readers.

Examples of the syntactic descriptors which are used in the explanation of the Verbatimness Test can be found in Appendix D. The Passages A_1 to D_2 which will be explained in this section of Chapter Three can be found in Appendix B.

Passages A_1 and A_2 each contained fourteen sentences. Six of these sentences were identical and in the same position for both passages. However eight of the sentences in passage A_2 contained different syntactic structures from those of Passage A_1 while maintaining the same meaning. In other words, sentence three of Passage A_2 had the same meaning as sentence three of Passage A_1, but the two sentences had different syntactic structures. The two sentences threes are presented below.

SENTENCE THREE OF PASSAGE I	"When he builds the doghouse it will take a lot of work."
SENTENCE THREE OF PASSAGE II	"His building of the doghouse will take a lot of work."

The two sentences shown above are called a sentence pair. Any two sentences in this study which have the same meaning but different syntactic structures and are in the same position in two similar passages are known as sentence pairs.

Passages A_1 and A_2 are known as passage pairs. Any two passages which have some sentences which are identical sentence-for-sentence and have at least one pair of sentences which are identical in meaning but not in syntactic structure are known as passage pairs.

Table 3.5 presents a sentence breakdown of the Passage Pairs A_1 and A_2. From the table it can be seen that some of the sentences in

Passage A_1 are identical in meaning, syntactic structure, and position in both passages. The sentence pairs (which are those sentences with identical meaning and position but different syntactic structures) can also be seen in Table 3.5 (ie. sentence 6 of Passages A_1 and A_2, sentence 9 of Passages A_1 and A_2, etc.). The table only shows the syntactic description of the sentence pairs since the syntactic description of the sentences which are identical in meaning, position and syntactic structure are of little concern to this study. Furthermore, the syntactic descriptions shown in Table 3.5 only describe the parts of a sentence pair that differ syntactically. It does not describe the parts of a sentence pair that are the same syntactically.

TABLE 3.5

SYNTACTIC DESCRIPTION OF SENTENCE PAIRS OF PASSAGE PAIR A_1 AND A_2

SENTENCE	PASSAGE A_1	PASSAGE A_2
1	Identical*	Identical
2	Identical	Identical
3	Active verb	Nominalization of active verb
4	Identical	Identical
5	Infinitive of purpose	Ing nominalization of purpose
6	Right branching clause	Emedded clause
7	Identical	Identical
8	Adverb clause	Adverb replacement deletion
9	Adjective	Relative clause
10	Identical	Identical
11	Identical	Identical
12	WH & S as object	Reflexive-intensive
13	Adjective	Relative clause
14	Intact form	Contraction

*Identical indicates that these sentences are the same in meaning, position, and syntactic structure.

As previously indicated Passages B_1 to D_2 were constructed from fourth-grade basal reader stories. The three stories used in Passages B_1 to D_2 were sampled after Fagan (1969). These three sampled stories are known as the basic stories. To these basic stories, one sentence constructed by the researcher, was added.

For Passages B_1 and B_2 the same basic story was used (Fagan, p. 313). To the basic story in Passage B_1 and to the same basic story in Passage B_2 a sentence was added. The sentence added to the basic story in Passage B_1 contained an active verb. The sentence added to the basic story in Passage B_2 was the same as the added sentence in Passage B_1 except that the active verb was nominalized. Thus the added sentences are a sentence pair because they had the same meaning but different syntactic structures. The added sentences are shown below.

PASSAGE B_1 "When the sun rises in the sky it will make the job harder."

PASSAGE B_2 "The rising of the sun in the sky will make the job harder."

Passages B_1 and B_2 are a passage pair since they had some sentences which were identical in meaning, position and syntactic structure but at least one pair of sentences with identical meaning and position but different syntactic structures.

For Passages C_1 and C_2 the same basic story was used (Fagan, p. 315). To the basic story in Passage C_1, and to the same basic story in Passage C_2, a sentence was added. The sentence added to the basic story in Passage B_1 contained a verb and complement structure. The sentence added to the basic story in Passage C_2 was the same as the added sentence in Passage C_1 except that a reflexive-intensive structure was used. The added sentences are a sentence pair and Passages C_1 and C_2 are a passage pair. The added sentences are shown below.

PASSAGE C_1 "The bird felt sorry that it could not fly."

PASSAGE C_2 "The bird felt sorry for itself."

For Passages D_1 and D_2 the same basic story was used (Fagan, p. 317). To the basic story in Passage D_1, and to the same basic story in Passage D_2, a sentence was added. The sentence added to the basic story of Passage D_1 contained a right branching clause. The sentence added to the basic story in Passage D_2 was the same as the added sentence in Passage D_1 except that an embedded clause structure was used. Passage D_1 and D_2 are a passage pair while the sentences added to these passages are a sentence pair. The added sentences are shown below.

PASSAGE D_1 "The sun was melting the silver frost that was very thick."

PASSAGE D_2 "The silver frost that the sun was melting was very thick."

Two points should be explained. In each sentence pair there is a sentence which should be syntactically harder (as has been shown by the research summarized in Table 2.1) than the other sentence of the sentence pair. This arrangement of a difficult syntactic structure paired with an easy syntactic structure was required in order to test the differences in verbatimness in responses to hard and easy sentences. It should be made plain however, that the more difficult syntactic structure (as determined by Table 2.1) will always be found in the Passages A_2, B_2, C_2 and D_2 while the easy syntactic structure (as determined by Table 2.1) will always be found in the Passages A_1, B_1, C_1 and D_1.

Furthermore it can be seen that in the Passage Pair A_1 and A_2 there are eight sentence pairs while in the rest of the passage pairs (Passages B_1 and B_2, Passages C_1 and C_2, Passages D_1 and D_2) there is only one sentence pair per passage pair. This means that in Passages A_1 and A_2 there are eight syntactic comparisons while in each of the remaining passage pairs there is only one syntactic comparison. This arrangement was conceived of as a solution to two problems - that of validity and generalizability. Many syntactic structures are compared in Passages A_1 and A_2 in order to provide findings which are not limited to only a few syntactic structures. However the readability findings which might result from Passages A_1 and A_2 could be criticized on the basis that many unusually difficult or easy syntactic structures were causing one or more of the syntactic comparisons to differ greatly. To solve this problem,the remaining passage pairs only had one syntactic comparison embedded in each basic story. Since the basic stories were not constructed by the author but sampled from existing basal readers, then the readability differences found between sentences of a sentence pair in Passages B_1, B_2, C_1, C_2, D_1 and D_2 should be due to the effect of syntactic changes in a normal context - not in the artificially constructed context of Passages A_1 and A_2.

Wh-questions were constructed for each of the passages of the Verbatimness Test. A wh-question is constructed by deleting a lexical constituent from a sentence and replacing it with an appropriate wh-pro-word. The purpose of these questions was to elicit responses to passage sentences which could be measured for verbatimness.

For each passage, two questions were constructed. One question for each passage was the target question while the other question was the dummy question.

The target question constructed for each passage always referred to one of the sentences of a sentence pair. Since in each Passage Pair B_1 and B_2, C_1 and C_2, D_1 and D_2 there was only one sentence pair, then there was only one sentence in each of these passages to which the question could refer. These sentences are known as the target sentences.

In Passages A_1 and A_2, there were a number of sentence pairs. For these passages the target question referred to the sentence pair which produced the greatest difference between "mean sentence scores" on the cloze tests of Passages A_1 and A_2. The particular sentences of this sentence pair will be known as target sentences.

The target questions were all constructed in the following manner. Since the target question referred to the two sentences of a sentence pair the words used in the stem of the question had to exist in both sentences of a sentence pair. As well, the words found in the stem of the question had to exist in the same position in both sentences. Consider the following sentence pair taken from Passage B_1 and B_2.

PASSAGE B_1 "When the sun rises in the sky it will make the job harder."

PASSAGE B_2 "The rising of the sun in the sky will make the job harder."

The only words the same in both sentences and in the same position in each sentence are "will make the job harder." These words became the stem of the question.

To the stem of the question was added the appropriate wh-pro-word. In the above example the appropriate wh-pro-word is "what." Thus the target question for the sentence pair in Passage B_1 and B_2 was, "What will make the job harder?" The other three target questions were constructed in the same manner. The other three target questions can be seen by consulting Appendix B.

As mentioned, the stem of the target question was constructed from the words which were the same and in the same position in each sentence of a sentence pair. This rule for question construction was decided upon to avoid any advantage in recall for one sentence of a sentence pair. This might have resulted if the target question had contained more words from one of the sentences of a sentence pair than the other sentence of the sentence pair. It was felt that the only way to avoid this situation was to ensure that the target question contained only the same words and in the same position in both sentences of a sentence pair.

As previously mentioned, two questions were constructed for each passage pair. One question was the target question while one question was the dummy question. Since the target question referred to a sentence pair which, in the Passage Pairs B_1 and B_2, C_1 and C_2, D_1 and D_2, always occurred near the beginning of the passages, it was feared that children might develop the tendency to concentrate on the initial portion of a passage only. To offset this possible tendency, a dummy question was constructed for each passage pair.

In each passage pair the dummy question referred to a sentence in a different position. In Passages A_1 and A_2 the dummy question referred to the last sentence of each passage. In Passages B_1 and B_2 the dummy question referred to a sentence two thirds of the way through each passage. In Passages C_1 and C_2 the dummy question referred to a sentence one third of the way through each passage. In Passages D_1 and D_2 the dummy question referred to the second last sentence in each passage. (Appendix B indicates precisely which sentence was referred to by the dummy question in each passage).

The dummy question was constructed in the same manner as the target questions. Since for Passage Pairs B_1 and B_2, C_1 and C_2 and D_1 and D_2, the dummy question referred to sentences which were identical in both passages and thus all words in the two sentences were the same, the string of words chosen to make up the stem of the question was an arbitrary choice made by the researcher. To the string of words chosen was added the appropriate wh-pro-word. In Passages A_1 and A_2 the dummy question referred to the last sentences which were in this case members of a sentence pair. The method used to construct the dummy question for these sentences was the same as the method used in constructing the target questions.

In order to control for the amount of time each child was allowed to read the passages, a machine called the Reading Tutor (Model A-104) was used. This type of controlled reader was used because it permits materials to be used in the machine which can be produced in the classroom by the teacher. Essentially the machine consists of a drum which allows a page to travel around it when pushed by a set of electrically-driven rubber wheels. The only view of what is travelling around the drum is through a window which is 18.5 cm by 3.4 cm in size. A shutter is provided which enables this viewing area to be reduced in size. For this experiment the viewing area was reduced to 3.4 cm by .9 cm, thus allowing only one line of print to be visible at any given time.

The Reading Tutor also has a variable speed control. This control was set so that the machine ran at approximately 118 w.p.m. This speed was set by rotating Passage A_2 through the machine and measuring the amount of time required for Passage A_2 to be entirely viewed. If the machine was running at the correct speed then Passage A_2 (which was 118 words long), could be viewed in exactly one minute as timed by a stop watch. To set the speed of the Reading Tutor, Passage A_2 was run through the machine and the variable speed control was adjusted until Passage A_2 could be viewed in exactly one minute. This calibration procedure was followed before each testing session when the machine had previously been moved.

The eight passages were typed using an IBM Selectric Typewriter with a Letter Gothic Ball. Each line was double spaced and consisted of approximately five words per line. Table 3.6 summarizes the pertinent information concerning the format of the passages.

As well Table 3.6 shows the readability levels of each passage plus the information used to compute the readability levels. Three formulas were used to assess the readability of the eight passages.

The Coleman Formula #2 (Rothkopf and Johnson, 1971) predicts the number of correct insertions for a cloze form of a passage. This formula bases its prediction on the number of one syllable words per 100 words and number of sentences per 100 words. The Coleman Formula does not predict the grade level of the passages but does predict the relative difficulty of the passages.

The Fog Index (Klare, 1974) does predict the grade level of the passages. It uses the number of words per sentence and the number of words of three or more syllables per 100 words as a basis for prediction.

TABLE 3.6

ANALYSIS OF PASSAGES WITH RESPECT TO FORMAT AND READABILITY

PAS-SAGE	NO. OF WORDS	NO. OF LINES	NO. OF WORDS PER LINE	NO. OF SENTENCES	NO. OF SENTENCES PER 100 WORDS	NO. OF WORDS PER SENTENCE	NO. OF 3 SYLLABLE WORDS PER 100 WORDS	NO. OF 1 SYLLABLE WORDS PER 100 WORDS	RATIO OF PREPOSIT-IONAL PHRASES TO SENTENCES	NO. OF HARD WORDS PER 100 WORDS	COLEMAN	FOG	LORGE
A_1	118	23	5.13	14	11.9	8.43	1.69	84.75	.05	.09	77.97	4.05	3.91
A_2	115	23	5.0	14	12.2	8.21	1.74	83.45	.08	.10	76.90	3.98	4.29
B_1	113	22	5.13	7	6.2	16.14	1.77	78.76	.08	.13	62.59	7.16	5.08
B_2	113	22	5.13	7	6.2	16.14	1.77	79.65	.09	.13	63.62	7.16	5.17
C_1	119	23	5.17	10	8.4	11.90	3.36	84.03	.09	.13	71.95	6.10	4.92
C_2	116	23	5.04	10	8.6	11.60	3.45	83.62	.10	.14	71.77	6.02	5.10
D_1	110	23	4.78	9	8.2	12.22	5.22	78.18	.09	.20	64.88	6.98	5.67
D_2	110	23	4.78	9	8.2	12.22	5.22	78.18	.09	.20	64.88	6.98	5.67

The Lorge Formula (Lorge, 1959) also predicts the grade level of the passages. It bases its prediction on the number of words per sentence, the ratio of prepositional phrases to sentences, and the ratio of hard words to the number of words. (Hard words are defined by the Dale List of 769 Easy Words.)

An analysis of the last three columns of Table 3.6 shows that the Coleman and Fog formulas both rate the Passage Pairs from hardest to easiest in the following order: Passage Pair B_1 and B_2, Passage Pair D_1 and D_2, Passage Pair C_1 and C_2, Passage Pair A_1 and A_2. The Lorge Formula differs from the other two formulas only in that it rates Passage Pair D_1 and D_2 as harder than Passage Pair B_1 and B_2.

A sample of the procedure followed for each testing session of the Verbatimness Test is shown in Appendix B. However two points about the procedure will require an explanation. The first point concerns the presentation of the questions immediately before the child read the passage and the second point concerns the eliciting of the response to the question immediately after the offset of the sentence which the question referred to. Both measures were introduced in order to obtain the maximum number of correct-responses and the minimum number of error-responses and no-responses.

The first measure, that of showing the questions to the child before he read the passage, was introduced in order to ensure that the target sentences were attended to. Research by Frase (1968, 1970) and by Kaplan and Simmons (1974) suggests that questions presented before a passage increase the learning of the information that the questions refer to. It was felt therefore, that questions presented before the passages used in this study, would increase the chances that the child attends to the target sentences in the passages. Thus, because attention to the target sentences is increased, the number of no-responses and error-responses should be reduced.

The second measure, that of eliciting the response to the questions immediately after the offset of the sentence which the question referred to, was introduced again to reduce the number of error-responses and no-responses. Given that short term memory has a limited capacity (Miller, 1957; Peterson and Peterson, 1959; Waugh and Norman, 1965; Howe, 1970), and given that a chunking storage strategy is likely a more efficient storage strategy than a more verbatim storage strategy since a chunking strategy requires less memory capacity per stimulus unit (see the discussion of the two storage strategies presented in Chapter Two), then any child using more of a verbatim strategy should recall less of the stimulus input over time than the child using more of a chunking storage strategy. Thus the longer the eliciting of the response is held after the offset of the target sentence, the more those children using a more verbatim strategy should have forgotten about the target sentence. Thus their responses would obtain low verbatim scores, not because they did not store the target sentences in a more verbatim fashion but because they had forgotten what was stored. In order to avoid this situation it was decided to elicit the response to the target sentence immediately after offset of the target sentence so that the negative effects over time of the verbatim storage strategy could be eliminated.

Validity and Reliability. Only content validity can be claimed for the Verbatimness Test. The questions used in the test do require at least a literal understanding of the sentences to which they refer in order to be answered correctly. Thus the task is not simply a recall task but a comprehension and recall task.

The words used in Passage A_1 and A_2 and the inserted sentences in the rest of the passages do not exceed the AA level of the Teachers Word Book Of 30,000 Words (Thorndike & Lorge, 1944). The basic passages used in Passages B_1 to D_2 were sampled from grade four basal readers. Thus the passages should be within the difficulty range of grade four reading material.

Hypothesis III requires that some of the sentences are syntactically more difficult to comprehend than others. In each passage pair except Passages B_1 and B_2 there is a sentence pair where the one sentence is significantly more difficult as measured by the cloze test than the other sentence of the sentence pair (see the findings in Chapter Four concerning the relative syntactic difficulty of sentence pairs).

To establish reliability a test-retest procedure was carried out. Twenty children, randomly sampled, were readministered the Verbatimness Test one month after the first administration of the test. The total scores obtained by each of the twenty children on the first administration correlated .64 with the total score obtained on the second administration of the test. In considering the comparatively low reliability coefficient on this test one should understand that the scoring procedure was quite sensitive. A change in position, a deletion, or an addition of one or two words could produce a large fluctuation in the score. For example, the two responses below differ in only one word yet their score differs by thirty three percent.

"The silver frost was very thick" Score = 67%

"The frost was very thick" Score = 33%

3. CLOZE TESTS

In order to determine the relative difficulty of different syntactic structures and in order to separate the subjects into groups of good and poor comprehenders a cloze instrument was used. The cloze test, first developed by W. Taylor, has been used extensively to test readability (Bormuth, 1966; Coleman, 1971; Fagan, 1969) and to test reading comprehension (Rankin, 1959; Weaver, 1965). The cloze test has been found to be both a valid and reliable measure of literal comprehension and readability.

For this study the cloze procedure was used on the eight passages in the Verbatimness Test. Each passage was made into five different cloze forms. The first form deleted the 1, 6, 11, etc. word of a passage. The second form deleted words 2, 7, 12, etc. The fifth form deleted words 5, 10, 11, etc. In this way five different cloze forms of each of eight passages were constructed producing forty cloze tests in all. All deletions were indicated bv lines of uniform length. The cloze tests were photo copied from a master test which was typed using an IBM Selectric machine with a Letter Gothic Ball. The lines were double spaced.

IV. PILOT STUDY

A pilot study was conducted during the early part of April in order to test the materials used in the study. One grade four class in one of the schools used in the main study was selected. Twenty of the thirty-one students were randomly selected for the pilot study although the cloze tests of Part I were administered to the entire class. The twenty selected students were randomly divided into two groups X and Z. The ten students of group X were then randomly divided into five subgroups. The same procedure was followed for group Z.

The procedure used for assignment of cloze tests to groups was exactly the same as that carried out in the main study (see Design of the Study in Chapter Three). The order of presentation of cloze tests was systematically varied to avoid any bias due to practice.

The completed cloze tests were then analyzed for the relative difficulty of different syntactic structures. As well, the students were ranked in terms of their total "passage cloze scores" to determine which students had higher and lower levels of comprehension ability.

For Part II of this study the five students of group X who ranked highest in their ability to comprehend, as measured by the cloze tests, were assigned to group GX. The lowest five students of group X were assigned to group PX. The same regrouping procedure was carried out with group Z producing groups GZ and PZ (good comprehenders and poor comprehenders respectively).

The remainder of the pilot study was carried out in the same manner as the main study except that, unlike the main study where students were asked to answer the questions orally, the pilot study asked the students to print or write their answers.

From the analysis of the pilot study a number of changes appeared necessary. Firstly, it was decided that the cloze testing should be done in smaller groups to insure that any student requesting assistance with pronouncing words would receive the assistance in the shortest possible time. Secondly, it was observed that almost all students had finished a cloze test within ten minutes and those who hadn't were not adding anything of significance after the first ten minutes. It was therefore decided to allow 12 minutes for each cloze test in the main study. Thirdly, when analysing the verbatimness of the responses to Part II of the study, it was observed that relatively little variability in responses existed between groups. It was decided therefore to ask the students to respond orally on the assumption that the constraints of the writing process were partly responsibile for the low variability between groups. It was decided that the instructions were sufficiently clear for students to understand what was being required of them.

V. COLLECTION OF THE DATA

All testing for the main study was carried out during the last week of April, 1975 and the first two weeks of May, 1975.

1. THE GRADED WORD LIST

The time required to administer the test was from four to seven minutes. The test was administered in a private room in each school and was administered individually to each child. Any child who was absent while the testers were in his school was eliminated from the study. The test was administered by the researcher and another person with experience in administering and scoring reading tests.

2. CLOZE TESTS

The cloze tests were administered in three groups of twenty or less and one group of forty. For this latter group the researcher was assisted by a fellow graduate student. At the beginning of the testing period the class co-operatively completed a short cloze test which was printed on the blackboard. This example was used to explain the test. All cloze tests were preassembled in their correct presentation order in a manilla envelope with the student's name on the top facing side of the envelope. Only one cloze test was taken from the envelope at any one time and in its proper order.

For each of the four cloze tests administered twelve minutes were allowed. Each testing session took approximately 75 minutes. A short three minute break was provided between the third and fourth cloze test. The cloze testing sessions were always conducted during the first portion of each school half day. Each session was conducted in a classroom with only the experimenter (and his assistant in the case of the group of 40) and the students who were participating in the study present. Any child who was absent for the cloze testing sessions was excluded from the study.

3. VERBATIMNESS TEST

Each student was administered this test alone and in a private room with only the experimenter present. This test was administered approximately one week after the cloze test. Before the students began the actual test a short paragraph was run through the Reading Tutor in order to familiarize the students with the speed of the machine and the window through which they could read the print. The time required to administer this test was from ten to fifteen minutes.

VI. SCORING THE TESTS

1. THE GRADED WORD TEST

The scoring procedure for this test was as follows. The child was asked to read the columns of words beginning with column one, then two, etc. The child was stopped on the column on which he made more than two errors. The column before the one in which he made more than two errors was then assigned as that child's word-identification level. The column number above this column was then translated into a grade level. This test was scored both by the researcher and by the assistant who helped administer the test.

2. CLOZE TESTS

Scoring of the cloze tests was by the exact insertion method. That is, only those responses which were exactly the same as the deleted word were considered correct. Changes in spelling were not considered to be errors.

A "sentence cloze score" was derived for the following sentences on the cloze test: all the sentences except sentence eleven of the cloze tests of Passages A_1 and A_2; the sentences of a sentence pair on the cloze tests on the remainder of the passages. The "sentence cloze score" was derived by adding the correct insertions on a given sentence and dividing by the number of deletions in that sentence. This score was obtained for each sentence indicated above on each cloze test administered.

For each cloze test administered a "passage cloze score" was obtained. This score was calculated by adding the number of correct insertions in a passage and dividing by the number of deletions in the passage.

A "mean cloze sentence score" was derived for each sentence of Passage A_1 and A_2 except sentence eleven and for each sentence of a sentence pair in Passages B_1 to D_2. This score was obtained by adding the "cloze sentence scores" obtained on a given sentence in a given passage and dividing by the number of students who were administered that passage.

A "mean cloze passage score" was derived for each passage as well. This was derived by adding the "cloze passage scores" obtained on a given passage and dividing by the number of students who were administered that passage.

Finally a total "passage cloze score" was derived for each student who participated in Part I of this study. This score was derived by adding the four "passage cloze scores" obtained by a given student on the four cloze passages administered to that student.

The cloze tests were scored both by the experimenter and the assistant who helped administer The Graded Word List Test.

3. VERBATIMNESS TEST

The responses to the dummy questions were not scored. Only the responses to the target questions were scored. For each response to a target question the following ratio scoring method was used. The numerator of the ratio was calculated by adding the number of words in the response. The denominator was calculated by adding all the words correctly recalled in the order in which they appeared in the target sentence, subtracting one and adding all these scores. This ratio score was then converted to a percent. For example, below is a target sentence and a response to this sentence.

TARGET SENTENCE	"When he builds the doghouse it will take a lot of work."
RESPONSE SENTENCE	"It will take a lot of work to build the doghouse."

Only the two groups of underlined words are correctly recalled in the same order. The first group of words scores (7 - 1) while the second group scores (2 - 1). These two scores are added (7 - 1) + (2 - 1) = 7 and divided by the number of words in the response, 11. Therefore the verbatimness score obtained on this sentence is 7/11. This score is then converted to a percent. This score is called the "verbatimness score."

A "mean verbatimness score" was obtained by adding the "verbatimness scores" of a given response obtained by children of a group and dividing by the number of children in a group.

A total "verbatimness score" was obtained by adding the four "verbatimness scores" of a child and dividing by four.

The verbatimness scoring method used in this study is an adaption of the "RSR" score used by Latham (1973) to measure the degree of serial order recall of responses to a word list.

The Verbatimness Test was scored entirely by the researcher.

VII. STATISTICAL TREATMENT OF THE DATA

Except for one treatment, all data were analyzed using computer programs designed by the Division of Educational Research Services of the University of Alberta.

1. ONE WAY ANALYSIS OF VARIANCE (ANOV 10)

This program consists of a "t" test calculated on independent samples, with or without missing data. To determine the differences between variances an F ratio is computed. Welch's approximation to "t" is calculated where variables have unequal variance. Correlations are also produced for the total group.

i. Cloze tests. The "t" test was used to determine whether significant differences existed between the "mean sentence cloze scores" of sentences of a sentence pair. This test was also used to determine whether there was a significant difference between the "mean sentence cloze scores" of sentences that were the same in Passages A_1 and A_2. This analysis was not done for sentence eleven of Passage A_1 and A_2.

The "t" test was used to determine whether significant differences existed between the "mean passage cloze scores" of a passage pair.

The "t" test was used to determine whether significant differences existed between the total "passage cloze scores" of groups PX and GX, groups PZ and GZ and of groups (PX + GX) and (PZ + GZ).

ii. Verbatimness tests. The "t" test was used to determine whether significant differences existed between the "mean verbatimness scores" of the good comprehenders (GX or GZ) and the poor comprehenders (PX or PZ).

The "t" test was also used to determine whether significant differences existed between the "mean verbatimness scores" of students who responded to hard syntactic sentences vs those who responded to easy syntactic sentences.

2. PEARSON PRODUCT MOMENT CORRELATION (ANOV 12)

This program provides "t" tests for differences between means and between variances for correlated samples. The program also produces correlations between samples.

Verbatimness Test. The Pearson Product Moment Correlation test was used to determine the reliability of the Verbatimness Test. The total "verbatimness scores" of the first administration of the test were compared to the total "verbatimness scores" of the second administration of the test.

VIII. SUMMARY

This chapter has described the experimental design, the sample, the testing instruments, the pilot study, the data collection and scoring procedures, and finally the statistical treatment of the data.

CHAPTER IV

ANALYSIS OF TEST DATA

The purpose of this chapter is to present and discuss the analysis of the test data. It will be sequenced in the following manner:

I. Results from Cloze Tests

II. Results from the Verbatimness Test

  1. For Good vs Poor Comprehenders

  2. For Easy vs Hard Syntactic Structures

I. RESULTS FROM THE CLOZE TESTS

The cloze tests were analysed for a number of purposes. In order to determine whether the groups X and Z were equal in their ability to comprehend, the "mean cloze sentence scores" (MCS scores)* of identical sentences in Passages A_1 and A_2 were compared. These comparisons are shown in Table 4.1 and the analysis of variance between these means is shown in Table 4.2. As a further check on the equality between groups X and Z the "mean cloze passage scores" were compared for passage pairs. These comparisons are shown on Table 4.3 while the analysis of variance between these means appears in Table 4.4.

In order to determine the relative difficulty of different syntactic structures which convey the same meaning, the MCS scores*

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*For the sake of convenience, MCS score will henceforth be used to refer to "mean cloze sentence scores".

TABLE 4.1

MEAN SCORES AND STANDARD DEVIATIONS FOR SENTENCES OF SENTENCE PAIRS IN ALL CLOZE PASSAGES, AND IDENTICAL SENTENCES IN CLOZE PASSAGES A_1 AND A_2*

PASSAGE	SENTENCE NUMBER	SYNTACTIC DESCRIPTOR	MEAN	S.D.	PASSAGE	SENTENCE NUMBER	SYNTACTIC DESCRIPTOR	MEAN	S.D.
A_1	1	Identical	55.10	47.04	A_2	1	Identical	59.57	43.79
A_1	2	Identical	65.31	45.88	A_2	2	Identical	58.51	45.88
A_1	3	Active Verb	60.94	33.10	A_2	3	Nominalization	45.72	30.60+
A_1	4	Identical	88.78	23.42	A_2	4	Identical	90.43	19.89
A_1	5	Infinitive of Purpose	59.18	44.10	A_2	5	Ing Nominalization of Purpose	59.57	42.53
A_1	6	Right Branching Clause	47.96	36.74	A_2	6	Embedded Clause	55.32	42.01
A_1	7	Identical	30.61	46.57	A_2	7	Identical	28.72	45.41
A_1	8	Adverb Clause	53.69	34.50	A_2	8	Adverb Replacement Deletion	58.51	42.12
A_1	9	Adjective	66.33	46.01	A_2	9	Relative Clause	60.28	35.22
A_1	10	Identical	64.24	35.88	A_2	10	Identical	59.55	35.43
A_1	12	Wh + S as Object	67.69	40.17	A_2	12	Reflexive-Intensive	57.45	47.45
A_1	13	Adjective	52.04	49.96	A_2	13	Relative Clause	51.06	38.26
A_1	14	Intact	59.18	33.34	A_2	14	Contraction	46.81	40.92
B_1	2	Active Verb	45.38	33.18	B_2	2	Nominalization	52.02	31.93
C_1	2	VB + Complement	45.92	35.11	C_2	2	Reflexive-Intensive	65.96	43.12++
D_1	3	Right Branching Clause	43.55	30.63	D_2	3	Embedded Clause	30.27	30.96+

*N = 96

+ Significant at the .05 level.

++ Significant at the .01 level.

TABLE 4.2

ANALYSIS OF VARIANCE BETWEEN MEAN SCORES FOR SENTENCES OF SENTENCE PAIRS IN ALL CLOZE PASSAGES, AND IDENTICAL SENTENCES OF CLOZE PASSAGES A_1 AND A_2

PASSAGE	SENTENCE	PASSAGE	SENTENCE	D.F.	T.	P-ONE TAIL
A_1	1	A_2	1	94	-0.482	0.31558
A_1	2	A_2	2	94	0.708	0.24029
A_1	3	A_2	3	94	2.336	0.01082
A_1	4	A_2	4	94	-0.371	0.35560
A_1	5	A_2	5	94	-0.044	0.48249
A_1	6	A_2	6	94	-0.915	0.18132
A_1	7	A_2	7	94	0.202	0.42031
A_1	8	A_2	8	94	-0.614	0.27032
A_1	9	A_2	9	94	0.720	0.23651
A_1	10	A_2	10	94	0.644	0.26044
A_1	12	A_2	12	94	1.140	0.12869
A_1	13	A_2	13	94	0.107	0.45743
A_1	14	A_2	14	94	1.627	0.05350
B_1	2	B_2	2	94	0.999	0.16024
C_1	2	C_2	2	94	-2.501	0.00705
D_1	3	D_2	3	94	-2.113	0.01862

TABLE 4.3

"MEAN CLOZE PASSAGE SCORES" AND STANDARD DEVIATIONS FOR PASSAGES OF PASSAGE PAIRS

PASSAGE	MEAN	S.D.	PASSAGE	MEAN	S.D.
A_1	59.04	12.79	A_2	56.89	11.93
B_1	36.96	13.31	B_2	38.63	15.02
C_1	43.63	18.70	C_2	45.43	15.29
D_1	38.11	12.13	D_2	36.31	11.91

TABLE 4.4

ANALYSIS OF VARIANCE BETWEEN "MEAN CLOZE PASSAGE SCORES" OF PASSAGES OF PASSAGE PAIRS

PASSAGE	D.F.	T.	P-ONE TAIL
A_1 & A_2	94	0.850	0.19883
B_1 & B_2	94	0.578	0.28246
C_1 & C_2	94	-0.513	0.30457
D_1 & D_2	94	-0.734	0.23244

of the sentences of a sentence pair were compared. These comparisons are shown in Table 4.1 and their analysis of variance is shown in Table 4.2.

From the data in Table 4.2 it can be observed that, none of the MCS scores of the sentences which were identical in Passage A_1 and A_2 ever differed significantly. None of the "mean cloze passage scores" of a passage pair (Table 4.4) ever differed significantly as well. This would suggest that the groups X and Z, did not differ significantly in their ability to comprehend as measured by the cloze tests. Furthermore the small differences between the "mean passage cloze scores" of the Passage Pairs B_1 vs B_2, C_1 vs C_2 and D_1 vs D_2 were in the same direction as the direction of the difference between the MCS scores of the sentence pairs within those passage pairs. That is, the passage with the higher "mean cloze passage score" of the passage pair contained the sentence with the higher MCS score of the sentence pair. This would further support the notion that sentence differences were measured in the cloze tests rather than group differences.

An analysis of the data in Table 4.1 shows that in the Passage Pair A_1 and A_2, the nominalization of an active verb structure had a lower MCS score than the active verb structure. This difference was significant at the .05 level ($p = .0108$ Table 4.2).

The same nominalization of an active verb vs its active verb comparison that existed in Passage A_1 and A_2, existed also in Passage B_1 and B_2. However, the direction of the difference between the MCS scores of these two sentences was opposite to that found in the nominalization-active verb comparison in Passages A_1 and A_2. This difference however, did not reach the .05 level of significance ($p = .16$, Table 4.2). It would therefore appear that every nominalization of an active verb structure was not more difficult than its active verb version. Since across these sentence pairs, almost identical syntactic structures were used, and since within each pair, almost identical lexical insertions were used, the different results of the two pairs of nominalization vs active verb sentences cannot be attributed entirely to the sentences themselves.

A further analysis of the data in Table 4.1 shows that the verb + complement structure of Passage C_1 was more difficult to comprehend than the reflexive-intensive structure of Passage C_2. This difference was significant at the .01 level ($p = .007$, Table 4.2).

The reflexive-intensive vs wh + s as object comparison of Passage A_2 and A_1 showed that the reflexive-intensive was the more difficult structure of the two (Table 4.1). This difference however, was not significant ($p = .128$, Table 4.2).

The mean difference between the right-branching clause sentence of Passage D_1 and the embedded clause sentence of Passage D_2 shown in Table 4.1, suggests that the embedded sentence structure was more difficult to comprehend than the right branching structure. This difference was significant at the .05 level ($p = .018$, Table 4.2). The results of this comparison were in the opposite direction to the right branching vs embedded comparison of Passage A_1 and A_2. However, this latter comparison was not significant ($p = .18$, Table 4.2). Since in the two pairs of right branching vs embedded comparisons the same lexical insertions were used within the pairs, and almost the same syntactic structures were used across the pairs, then the reason for the differences between the direction of sentence pairs cannot be attributed entirely to the sentences themselves. One can conclude that all embedded structures were not more difficult than their right branching equivalents and that other factors may have accounted for their relative difficulty.

Only syntactic differences which occurred very near to the beginning of a passage, appeared to reach a statistically significant level of difference. The right branching vs embedded clause comparison of Passages D_1 and D_2 reached an acceptable level of difference but the same comparison in Passage A_1 and A_2 did not reach an acceptable level of difference. In Passages D_1 and D_2, this comparison occurred near the beginning of the passages while in Passages A_1 and A_2, this comparison occurred farther from the beginning of the passages.

However, every syntactically-differing pair which occurred near the beginning of a passage did not reach an acceptable level of difference. The active verb vs nominalization comparison, which occurred near the beginning of Passages B_1 and B_2, did not reach a significant level of difference.

Of the sentence pairs which did not differ significantly, two of the pairs had too small a difference between MCS scores to suggest any direction. These pairs were, the infinitive of purpose vs the ing nominalization of purpose of Passages A_1 and A_2, and the second adjective vs relative clause of Passage A_1 and A_2.

Of the sentence pairs which did not reach acceptable levels of difference, three tended in the same direction as was found by Fagan (p. 163). These were the wh + s as object vs reflexive-intensive of Passage A_1 and A_2, the first adjective vs relative clause of Passage A_1 and A_2, and the intact vs contraction of Passage A_1 and A_2. This latter comparison almost reached the .05 significance level ($p = .053$, Table 4.2).

The difference between the MCS scores of two of the sentence pairs of Passages A_1 and A_2 which did not reach acceptable levels of difference tended in the opposite direction to that suggested by other researchers. These were, the right branching vs the embedded sentences (Coleman, 1966; Schlesinger, 1968) and the adverbial clause vs adverb deletion (Fagan, 1969). This study found that the right branching sentence of Passage A_1 was more difficult than the embedded clause sentence of Passage A_2, and the adverbial clause sentence of Passage A_1 was more difficult than the adverb deletion of Passage A_2.

As was previously stated, in order to test the third hypothesis, it was necessary to have pairs of passages that had at least one sentence pair with sentences which differed significantly in their comprehensibility. From the results of the cloze tests, Passage Pair A_1 and A_2, C_1 and C_2, and D_1 and D_2 do have one sentence pair each with sentences which differ above the chance level. Only Passages B_1 and B_2 do not have a sentence pair with sentences which are significantly different in their comprehensibility.

II. RESULTS FROM THE VERBATIMNESS TEST

1. FOR GOOD VS POOR COMPREHENDERS

In order to determine if poor comprehenders produce more verbatimness in their comprehension answers than good comprehenders, the "mean verbatim scores" (MV scores)* for good comprehenders of group X (group GX) were compared to the MV scores* of the poor comprehenders of group X (group PX) for each passage administered. The same procedure was followed for groups GZ and PZ. The means and standard deviations of GX and PX for the Passages A_1, B_2, C_1 and D_2 are shown in Table 4.5. The analysis of variance for these means is shown in Table 4.6. These scores were based on all-responses, - that is, they include correct-responses, no-responses which were scored as zero, as well as error-responses (answers which were clearly a comprehension error) which were scored in terms of verbatimness as though they were correct-responses.

An analysis of the MV scores of Table 4.5 suggests that, in all cases, the good comprehenders answered more verbatim than did the poor comprehenders. However, only on Passage D_2 did the difference between means reach the .05 level ($p = .037$, Table 4.6). The difference in means between groups on Passage B_2 came close to the .05 level ($p = .055$, Table 4.6).

*For the sake of convenience, the MV score will henceforth refer to the "mean verbatim score"

TABLE 4.5

MEANS AND STANDARD DEVIATIONS OF GROUPS GX AND PX ON PASSAGES A_1, B_2, C_1 AND D_2 OF THE VERBATIMNESS TEST*

PASSAGE	$GX\overline{M}$	$PX\overline{M}$	GX S.D.	PX S.D.
A_1	51.57	40.29	20.38	26.84
B_2	60.79	43.21	23.14	32.34
C_1	45.00	33.43	24.16	24.69
D_2	50.57	33.93	24.48	22.98+

* N = 28

+ Difference between means is significant at the .05 level.

TABLE 4.6

ANALYSIS OF VARIANCE BETWEEN MEANS OF GROUPS GX AND PX

PASSAGE	D.F.	T.	P-ONE TAIL
A_1	26	1.253	0.11066
B_2	26	1.653	0.05514
C_1	26	1.253	0.11062
D_2	26	1.855	0.03751

The MV scores and standard deviations for groups GZ and PZ for Passages A_2, B_1, C_2 and D_1 are shown in Table 4.7. The analysis of variance between these means is shown in Table 4.8. Again, these scores are based on all-responses of the subjects including correct-responses, no-responses, and error-responses.

TABLE 4.7

MEANS AND STANDARD DEVIATIONS OF GROUPS GZ AND PZ ON PASSAGES A_2, B_1, C_2 AND D_1 OF THE VERBATIMNESS TEST*

PASSAGE	GZ$\bar{M}$	PZ$\bar{M}$	GZ S.D.	PZ S.D.
A_2	65.64	55.31	19.38	30.16
B_1	69.50	45.08	16.70	36.10+
C_2	55.57	61.15	29.02	19.62
D_1	49.50	35.46	14.64	28.24

*N = 27
+ Difference between means reached the .05 significance level.

TABLE 4.8

ANALYSIS OF VARIANCE BETWEEN MEANS OF GROUPS GZ AND PZ

PASSAGE	D.F.	T.	P-ONE TAIL	WELCH ADJUSTMENT+
A_2	25	1.068	-0.14797	
B_1	25	2.284	0.01556	0.0200
C_2	25	-0.581	0.28329	
D_1	25	1.639	0.05684	0.063

+Welch's approximation to "t" is only reported when variances are sufficiently unequal to warrant the Welch test.

An analysis of the mean differences of Table 4.7 reveals that three out of the four comparisons favoured the good comprehenders as having produced more verbatimness in their answers than the poor comprehenders. Again, only one of these comparisons, that of Passage

B_1, reached the .05 level of significance ($p = .015$, Table 4.8). When the variances of the means of GZ and PZ on Passage B_1 were analysed for equality, it was found that there was a large disparity between variances. Therefore, Welch's approximation to "t" was calculated resulting in a $p = 0.0200$. Thus the Passage B_1 difference between means was still significant at the .05 level.

The Passage D_1 comparison of means which showed that good comprehenders responded more verbatim than poor comprehenders approached the .05 level of significance ($p = 0.056$). However the variances of the two groups were again substantially unequal and on Welch's approximation to "t", a p of 0.063 was obtained.

On one passage, Passage C_2, the direction of difference between means suggested that poor comprehenders answered more verbatim than good comprehenders. This mean difference however, did not approach significance and was, in fact, the least significant of the mean comparisons of all the X and Z group comparisons.

In order to determine whether the lower MV scores of the poor comprehenders were due to a greater proportion of no-responses (which were scored as zero), the no-responses were eliminated from the data and the data reanalysed. The MV scores then represent a measure of verbatimness in answers when the child gave an answer regardless of whether the answer was correct or incorrect. Table 4.9 summarizes the distribution of no-responses for each group and passage. Table 4.10 summarizes the MV scores and standard deviations of groups GX and PX when no-responses were eliminated. Table 4.11 summarizes the analysis of variance on these means.

TABLE 4.9

SUMMARY OF NO-RESPONSES OF ALL GROUPS ON THE EIGHT PASSAGES OF THE VERBATIMNESS TEST*

PASSAGE	GX	PX	TOTAL	PASSAGE	GZ	PZ	TOTAL
A_1	0	0	0	A_2	0	0	0
B_2	0	3	3	B_1	0	2	2
C_1	0	1	1	C_2	0	0	0
D_2	1	0	1	D_1	0	0	0
TOTAL	1	4	5		0	2	2

*N = 55

From the data in Table 4.9 it can be seen that the poor comprehenders of group X and group Z made almost all the no-responses which is to be expected. It is also evident that most of the no-responses were made on Passages B_1 and B_2. These were the hardest passages, as measured by two of the readability formulae (Table 3.6), and among the hardest passages as measured by the cloze tests of this study (Table 4.3).

TABLE 4.10

MEANS AND STANDARD DEVIATIONS OF GROUPS GX AND PX ON PASSAGES A_1, B_2, C_1 AND D_2 OF THE VERBATIMNESS TEST WITH NO-RESPONSES ELIMINATED

PASSAGE	GX$\overline{M}$	PX$\overline{M}$	GX S.D.	PX S.D.
A_1+	51.57	40.29	20.38	26.84
B_2++	60.79	55.00	23.14	25.43
C_1+++	45.00	36.00	24.16	23.66
D_2+++	54.46	33.93	20.48	22.98*

+ N = 28
++ N = 25
+++ N = 27
* Difference is significant at the .05 level.

TABLE 4.11

ANALYSIS OF VARIANCE BETWEEN MEANS OF GROUPS GX AND PX WITH NO-RESPONSES ELIMINATED

PASSAGE	D.F.	T.	P-ONE TAIL
A_1	26	1.233	0.11066
B_2	23	0.594	0.27904
C_1	25	0.977	0.16905
D_2	25	2.443	0.01098

With no-responses eliminated, the direction of difference between poor and good comprehenders remained the same for groups PX and GX. That is, good comprehenders answered more verbatim than did poor comprehenders. However on two of the passages, Passage B_2 and C_1, the mean difference between groups was reduced. On these two passages there were more no-responses produced by group PX.

On Passage D_2 where group GX had more no-responses, the mean difference increased. This later passage had the only mean difference which reached the .05 level of significance (p = .0109, Table 4.11).

From a comparison of the results of the MV scores which included no-responses (Table 4.5), to those which eliminated no-responses (Table 4.10), it would appear that for groups GX and PX, no-responses alone could not account totally for the difference between MV scores of good vs poor comprehenders.

Table 4.12 summarizes the MV scores of groups GZ and PZ when the no-responses were eliminated from the data. Table 4.13 shows the analysis of variance between the mean of groups GZ and PZ.

TABLE 4.12

MEANS AND STANDARD DEVIATIONS OF GROUPS GZ AND PZ ON PASSAGES A_2, B_1, C_2 AND D_1 OF THE VERBATIMNESS TEST WITH NO-RESPONSES ELIMINATED

PASSAGE	GZ$\overline{N}$	PZ$\overline{N}$	GZ S.D.	PZ S.D.
A_2+	65.64	55.31	19.38	30.16
B_1++	69.50	53.27	16.70	32.92
C_2+	55.57	61.15	29.02	19.62
D_1+	49.50	35.46	14.64	28.24

+ N = 27
++ N = 25

TABLE 4.13

ANALYSIS OF VARIANCE BETWEEN MEANS OF GROUPS GZ AND PZ WITH NO-RESPONSES ELIMINATED

PASSAGE	D.F.	T.	P-ONE TAIL	WELCH ADJUSTMENT
A_2	25	1.065	0.14797	
B_1	23	1.606	0.06095	0.07906
C_2	25	-0.581	0.28329	
D_1	25	1.639	0.05684	0.06328

It is evident from a comparison of the MV scores in Table 4.7 to Table 4.12 that, when no-responses were eliminated, the mean differences tended to become smaller. With groups GZ and PZ, only on Passage B_1 were there any no-responses. These were all produced by group PZ. With the no-responses of group PZ eliminated, their mean increased with a resulting decrease in the mean difference. With no-responses eliminated, the mean difference in Passage B_1 was no longer significant. Thus none of the mean differences between group GZ and PZ were significant when no-responses were eliminated. However, three of the four mean differences retained the direction of good comprehenders producing more verbatimness in their answers than poor comprehenders.

In order to determine whether the difference in the MV scores between poor and good comprehenders was a result of a disproportionate number of error-responses as well as no-responses being made by poor comprehenders, the error-responses as well as no-responses were eliminated from the data and reanalysed. The score obtained when error-responses and no-responses were eliminated represents the score obtained when the child answered the question correctly.

Table 4.14 summarizes the number of error-responses made by each group on a passage.

TABLE 4.14

SUMMARY OF ERROR-RESPONSES OF ALL GROUPS ON THE EIGHT PASSAGES OF THE VERBATIMNESS TEST*

PASSAGE	GX	PX	TOTAL	PASSAGE	GZ	PZ	TOTAL
A_1	0	1	1	A_2	0	1	1
B_2	2	1	3	B_1	0	3	3
C_1	0	0	0	C_2	1	2	3
D_2	10	11	21	D_1	7	8	15
TOTAL	12	13	25		8	14	22

* N = 55

From the data in Table 4.14 it can be seen that group PX made only one more error than group GX. group PZ however, made six more errors than group GZ. It is to be expected of course, that the poor comprehenders would make more errors than the good comprehenders. A majority of the errors, as shown by Table 4.14, were produced on Passage D_1 and D_2 with Passage D_2 producing the most errors. Since the embedded clause sentence of Passage D_2 was found to be significantly more difficult than the right-branching clause sentence of Passage D_1, the relative difficulty of Passage D_2 over Passage D_1 is again to be expected. As well, these two structures scored among the lowest of all the sentences of all the passages. It is therefore reasonable to expect these sentences to produce the greatest number of errors. Most of the errors of Passages D_1 and D_2 were characterized by the substitution of the words ice or snow for the word frost in the answers.

Table 4.15 below, shows the MV scores for groups GX and PX when the no-responses and error-responses were eliminated while Table 4.16 shows the variance between these means.

TABLE 4.15

MEANS AND STANDARD DEVIATIONS OF GROUPS GX AND PX ON PASSAGES A_1, B_2, C_1 AND D_2 OF THE VERBATIMNESS TEST WITH ERROR-RESPONSES AND NO-RESPONSES ELIMINATED

PASSAGE	GX$\overline{M}$	PX$\overline{M}$	GX S.D.	PX S.D.
A_1+	51.57	43.38	20.38	25.19
B_2++	68.42	60.50	12.13	18.67
C_1+	45.00	36.00	24.16	23.66
D_2+++	71.33	52.33	7.51	13.65

+ N = 27
++ N = 22
+++ N = 6

TABLE 4.16

ANALYSIS OF VARIANCE BETWEEN MEANS OF GROUPS GX AND PX WITH ERROR-RESPONSES AND NO-RESPONSES ELIMINATED

PASSAGE	D.F.	T.	P-ONE TAIL	WELCH ADJUSTMENT
A_1	25	0.932	0.18023	
B_2	20	1.199	0.12231	0.13350
C_1	25	0.977	0.16905	
D_2	4	2.113	0.05110	

An analysis of the data in Table 4.15 shows that in all cases, the good comprehenders answered more verbatimly than did the poor comprehenders. However, none of the mean differences of Table 4.15 were significant. Only the MV scores of groups PX and GX on Passage D_2 approached the .05 level of significance ($p = .051$, Table 4.16).

When the mean differences of answers with no-responses and error-responses eliminated (Table 4.15), were compared to the mean differences when these factors were not eliminated (Table 4.5), it was evident that the mean differences were smaller when no-responses and error-responses were eliminated. In fact, the mean differences became so small that they were no longer significant. However, even when no-responses and error-responses were eliminated, the direction of difference between means was still constant for groups GX and PX with good comprehenders answering more verbatimly than poor comprehenders. Error-responses and no-responses could not account for all the difference in verbatimness between groups GX and PX.

Table 4.17 shows the MV scores and standard deviations for groups GZ and PZ with no-responses and error-responses eliminated from the data. Table 4.18 summarizes the analysis of variance for these means.

TABLE 4.17

MEANS AND STANDARD DEVIATIONS OF GROUPS GZ AND PZ FOR PASSAGES A_2, B_1, C_2 AND D_1 OF THE VERBATIMNESS TEST WITH ERROR-RESPONSES AND NO-RESPONSES ELIMINATED

PASSAGE	GZ$\overline{M}$	PZ$\overline{M}$	GZ S.D.	PZ S.D.
A_2+	65.64	59.94	19.38	26.29
B_1++	69.50	64.38	16.70	23.49
C_2+++	57.31	66.18	29.44	15.05
D_1++++	53.00	44.00	13.56	27.83

+ N = 26
++ N = 22
+++ N = 24
++++ N = 12

TABLE 4.18

ANALYSIS OF VARIANCE BETWEEN MEANS OF GROUPS GZ AND PZ WITH ERROR-RESPONSES AND NO-RESPONSES ELIMINATED

PASSAGE	DF.	T.	P-ONE TAIL	WELCH ADJUSTMENT
A_2	24	0.638	0.26468	
B_1	20	0.598	0.27840	
C_2	22	-0.933	0.18824	0.17723
D_1	10	0.750	0.23532	0.26570

An analysis of the data in Table 4.17 shows that in three of the four cases, the direction of the difference between MV scores favoured the group GZ. That is, in three of the four cases, good comprehenders answered with more verbatimness than poor comprehenders. However, the differences between the means on these three passages did not reach an acceptable level of significance.

On Passage C_2, the direction of difference between the MV scores of GZ and PZ countered that of the other three comparisons. On this comparison the poor comprehenders produced more verbatimness in their answers than the good comprehenders. The difference between the means on this passage did not reach an acceptable level of difference.

When the mean differences of answers with no-responses and error-responses eliminated (Table 4.17), were compared to the mean differences with these factors not eliminated (Table 4.7), it was evident in two cases that the mean differences were smaller when no-responses and error-responses were eliminated. On Passage A_2 and B_1 the mean difference became smaller when error-responses and no-responses were eliminated from the data. In these two cases error-responses and no-responses must have produced some of the difference between good and poor comprehenders. However, even with these factors eliminated, the direction did not change.

On Passage D_1, the mean difference remained approximately the same, thus preserving the trend that poor comprehenders produced less verbatimness in their answers than good comprehenders.

Only on Passage C_2, where the direction countered the trend of the other three comparisons of GZ and PZ, and the trend established by all four comparisons of GX and PX, did the difference between means increase although the difference did not reach the .05 level of significance. Here as well, it would appear the no-responses and error-responses influenced the difference between means - in this case causing the difference to be smaller.

With the exception of Passage C_2 the trend is evident (though not significant) that, with error-responses and no-responses eliminated, the good comprehenders answered with slightly greater verbatimness than did poor comprehenders.

2. FOR EASY VS HARD SYNTACTIC STRUCTURES

In order to determine if sentences with hard syntactic structures cause comprehenders to answer more verbatim than sentences with easy syntactic structures, the MV scores of group (GX & PX) responding to one sentence of a sentence pair, was compared to the MV scores of group (GZ & PZ) responding to the other sentence of a sentence pair. One sentence of each sentence pair was more difficult to comprehend than the other sentence of the sentence pair as measured by the cloze tests and as reported in the first part of this chapter. To help keep this fact clearly in mind, the tables in this part of the chapter have been arranged so that the MV scores on the right are the answers to the easy sentence of a sentence pair, while those on the left are the answers to the hard sentence of a sentence pair. It should be emphasized that the sentence pair in Passages B_1 and B_2 did not reach a significant level of difference (Table 4.2) and the mean verbatim differences obtained while responding to these sentences should be interpreted with some caution.

Table 4.19 shows the MV scores and standard deviations when all-responses are scored. Table 4.20 shows the analysis of variance between the above mentioned means. In reading Table 4.19, only the means read across the table can be compared since only across the table are the meanings of sentences held constant.

TABLE 4.19

MEANS AND STANDARD DEVIATIONS OF ANSWERS TO HARD AND EASY SENTENCES BY GROUPS (GX & PX) AND (GZ & PZ)*

PASSAGE	$\overline{M}$	S.D.	PASSAGE	$\overline{M}$	S.D.
A_1	45.93	24.08	A_2	60.67	25.20+
B_2	52.00	29.01	B_1	57.74	29.93
C_2	58.26	24.64	C_1	37.21	24.68++
D_1	42.74	22.94	D_2	42.25	24.79

* N = 55
+ Difference is significant at the .05 level.
++ Difference is significant at the .01 level.

TABLE 4.20

ANALYSIS OF VARIANCE BETWEEN MEANS OF GROUPS (GX & PX) AND (GZ & PZ)

PASSAGE	D.F.	T.	P-ONE TAIL
A_1 and A_2	53	-2.218	0.01544
B_2 and B_1	53	-0.722	0.23661
C_2 and C_1	53	-2.863	0.00300
D_1 and D_2	53	-0.076	0.46981

The MV score comparisons shown in Table 4.19 were not consistent. The mean difference of Passage D_1 vs Passage D_2 was so small that no direction could be predicted.

The direction of the difference between MV scores of Passages B_1 vs B_2, suggests that a more difficult sentence was recalled more verbatim than a less difficult sentence. However, this mean verbatim difference was not significant ($p = .23$, Table 4.20). The difference in MV scores of Passages A_1 vs A_2 was significant at the .05 level ($p = .015$, Table 4.20) and the direction of difference indicated that the more difficult sentence was recalled more verbatim than the less difficult sentence.

However, the direction of the difference between MV scores of Passages C_1 vs C_2 countered the above mentioned trend. The less difficult sentence of Passage C_2 was recalled more verbatim than the more difficult sentence of Passage C_1. This difference was significant at the .01 level ($p = .003$, Table 4.20). Thus it would appear that the results summarized in Table 4.19 are somewhat contradictory.

In order to determine whether the verbatimness results on hard and easy sentences were due to a greater proportion of no-responses occurring in one or the other sentence of a sentence pair, the no-responses were eliminated from the data and the data was then reanalysed. Table 4.21 shows the MV scores and standard deviations of responses to easy and hard sentences when no-responses were eliminated. Table 4.22 summarizes the analysis of variance between these means.

TABLE 4.21

MEANS AND STANDARD DEVIATIONS OF ANSWERS TO HARD AND EASY SENTENCES BY GROUPS (GX & PX) AND (GZ & PZ) WITH NO-RESPONSES ELIMINATED*

PASSAGE	$\overline{M}$	S.D.	PASSAGE	$\overline{M}$	S.D.
A_1	45.93	24.08	A_2	60.67	25.20+
B_2	58.24	62.36	B_1	62.36	25.89
C_2	58.26	24.64	C_1	40.67	23.90++
D_1	42.74	22.94	D_2	43.81	23.81

* For Passages A_1 and A_2, N = 55; for Passages B_1 and B_2, N = 50; for Passages C_1 and C_2, D_1 and D_2, N = 54.

+ Difference is significant at the .05 level.

++ Difference is significant at the .01 level.

TABLE 4.22

ANALYSIS OF VARIANCE BETWEEN MEANS OF GROUPS (GX & PX) AND (GZ & PZ) WITH NO-RESPONSES ELIMINATED

PASSAGE	D.F.	T.	P-ONE TAIL
A_1 and A_2	53	-2.218	0.01544
B_2 and B_1	48	-0.585	0.28051
C_2 and C_1	52	-2.663	0.00514
D_1 and D_2	52	0.169	0.43333

Since there were no no-responses in Passage A_1 or A_2 these means (Table 4.21) did not change. The direction of difference shows that hard sentences elicit greater verbatimness in answers than do easy sentences. This difference was significant at the .05 level ($p = .015$, Table 4.22). The difference between the MV scores of Passages B_1 vs

B_2 supported the trend found in Passages A_1 vs A_2 but the difference between MV scores of B_1 vs B_2 was not significant (Table 4.22).

The direction of difference between the MV scores of Passages C_1 vs C_2 shows that answers to hard sentences were less verbatim than answers to easy sentences. This difference was significant at the .01 level (T = .005, Table 4.22) and the direction of difference countered that found in Passages A_1 vs A_2 and B_1 vs B_2.

The difference between MV scores for Passages D_1 vs D_2 was again, too small to predict the direction of difference.

When no-responses were eliminated from the data, again, an inconsistent picture emerges. The two significant differences countered each other in direction. One of the nonsignificant differences favoured the hard sentences as producing more verbatimness in answers while the other nonsignificant difference was too small to enable its direction to be predicted.

When the mean differences of answers to hard and easy sentences with no-responses eliminated (Table 4.21), were compared to the mean differences of answers with this factor not eliminated (Table 4.19), one finds that the mean differences on two of the comparisons (Passages B_1 vs B_2 and Passages C_1 vs C_2) became slightly smaller suggesting that no-responses may have influenced the results slightly. The mean difference on Passage A_1 vs A_2 did not change since there were no no-responses in the answers to these passages. Finally, although the mean differences were extremely small in Passages D_1 vs D_2, the direction of difference did change when no-responses were eliminated. In short, no-responses made little change in the results when they were eliminated.

In order to determine whether answers to hard and easy sentences differed in verbatimness when no-responses and error-responses were eliminated, the data were reanalysed without the no-responses and error-responses present. Table 4.23 shows the MV scores and standard deviations with no-responses and error-responses eliminated. Table 4.24 summarizes the analysis of variance on these means.

TABLE 4.23

MEANS AND STANDARD DEVIATIONS OF ANSWERS TO HARD AND EASY SENTENCES BY GROUPS (GX & PX) AND (GZ & PZ) WITH NO-RESPONSES AND ERROR-RESPONSES ELIMINATED*

PASSAGE	$\overline{M}$	S.D.	PASSAGE	$\overline{M}$	S.D.
A_1	47.63	22.76	A_2	63.00	22.53++
B_2	64.82	15.58	B_1	67.64	19.05
C_2	61.38	23.90	C_1	40.67	23.90++
D_1	49.25	20.09	D_2	61.83	14.33

* For Passages A_1 and A_2, N = 53; for Passages B_1 and B_2, N = 45; for Passages C_1 and C_2, N = 51; for Passages D_1 and D_2, N = 18.

++ Difference is significant at the .01 level

TABLE 4.24

ANALYSIS OF VARIANCE BETWEEN MEANS OF GROUPS (GX & PX) AND (GZ & PZ) WITH NO-RESPONSES AND ERROR-RESPONSES ELIMINATED

PASSAGE	D.F.	T.	P-ONE TAIL
A_1 and A_2	51	-2.470	0.00845
B_2 and B_1	42	-0.537	0.29702
C_2 and C_1	49	-3.088	0.00166
D_1 and D_2	16	1.362	0.09608

An analysis of the data in Table 4.23 shows that in three of the four comparisons, the harder sentence elicited more verbatimness than did the easier sentence. Only one of these comparisons however was significant. The difference between the MV scores of Passage A_1 vs A_2 was significant at the .01 level ($p = .008$, Table 4.24).

Passage C_1 vs C_2 on the other hand, produced results which countered the above mentioned trend. In this case the harder sentence elicited less verbatimness than did the easier sentence and this difference was significant at the .01 level ($p = .0016$, Table 4.24).

When the results of the analysis of verbatimness when no-responses and error-responses were eliminated (Table 4.23), were compared to the results of the analysis of verbatimness when these factors were not eliminated (Table 4.19), one finds little change in the first three comparisons. However on the fourth comparison (Passages D_1 and D_2), there was some change. When the means of the hard and easy sentences in these passages were compared when all-responses were scored, there was little difference (Table 4.19). However when these MV scores were compared using data with no-responses and error-responses eliminated, one finds that the harder sentence elicited more verbatimness than did the easier sentence. This difference however was not significant ($p = .096$, Table 4.24). Again no-responses and error-responses could not entirely account for the differences in answers elicited by hard and easy sentences.

III. SUMMARY

The findings resulting from the presentation and analysis of the data are summarized as follows:

1. From the analysis of the cloze tests it was found that:
   - i) a sentence written with a nominalization of an active verb was significantly harder to comprehend than a sentence written with a detransformed active verb;
   - ii) the verb plus complement structure was significantly more difficult than the reflexive-intensive structure;
   - iii) the embedded clause structure was significantly more difficult than the right-branching clause structure;
   - iv) all nominalization of active verb structures were not harder than their active verb detransformations;
   - v) all embedded clause structures were not more difficult than their right-branching clause equivalents.

2. Of the syntactic comparisons made which did not reach acceptable levels of significance, two comparisons were too close to make any statement concerning direction. Three of the nonsignificant comparisons maintained the same direction of difference as was found by other researchers while two of the comparisons went in a direction contrary to the direction found by other researchers.

3. Only syntactic comparisons which occurred near the beginning of a passage reached an acceptable level of significance although all syntactic comparisons appearing near the beginning of a passage did not reach an acceptable level of difference.

4. When all-responses on the Verbatimness Test were analysed

for groups GX and PX, it was found that good comprehenders answered more verbatim than poor comprehenders on all four of the passages. Only on one of these passages, however, did the difference between means reach an acceptable level of significance.

When no-responses were eliminated from the data, the good comprehenders continued to produce more verbatimness in their answers. Although the difference between means changed slightly when no-responses were eliminated, the no-responses were not considered to be a sufficient cause to explain the difference in verbatimness between good and poor comprehenders.

When no-responses and error-responses were both eliminated from the data, the good comprehenders continued to produce more verbatimness in their answers than poor comprehenders in all passages. However, the one mean difference which reached significance when all-responses were analysed, ceased to be significant when no-responses and error-responses were eliminated. Because of the consistent trend, no-responses and error-responses were not considered as a sufficient reason to explain the differences between good and poor comprehenders.

5. When all-responses on the Verbatimness Test were analysed for groups GZ and PZ, it was found that on three out of four passages, the mean differences favoured the good comprehenders as producing more verbatimness in their answers. One of these three comparisons reached an acceptable level of significance. On one of the four passages, the poor comprehenders produced more verbatimness in their answers although this finding achieved the lowest level of significance.

When no-responses were eliminated from the data of groups GZ and PZ, the mean difference of GZ and PZ on the one passage where no-responses occurred became sufficiently small so that it was no longer significant. Thus, after no-responses were eliminated, three of the four comparisons showed good comprehenders producing more verbatimness and one comparison showed poor comprehenders producing more verbatimness. None of these comparisons reached significance. Again, because of the consistent trend, no-responses alone could not account for all the difference in verbatimness between groups.

When no-responses and error-responses were eliminated from the data, the mean differences of groups GZ and PZ on the passages which had previously shown good comprehenders to produce more verbatimness, became smaller in two cases and remained about the same in one case. On the one passage where poor comprehenders had produced more verbatimness, the mean difference increased when no-responses and error-responses were eliminated although it did not reach significance. Again, because of the consistent trend, error-responses and no-responses could not explain all the difference in verbatimness between good and poor comprehenders.

6. The results of the analysis of the MV scores when the answers were elicited by an easy or hard sentence were not clear cut. When all-responses were considered, two of the four comparisons showed that hard sentences elicited more verbatimness than easy sentences. One of these comparisons was significant. One comparison had too small a difference to allow any prediction and one of the comparisons showed that easy sentences produced significantly more verbatimness than hard sentences.

When no-responses were eliminated from the data, little change in results was observed suggesting that no-responses were not affecting the results.

When no-responses and error-responses were eliminated from the data, the number of comparisons where hard sentences elicited more verbatimness increased from two to three. One of these three comparisons was significant. The one comparison where an easy sentence elicited more verbatimness was significant when these factors were eliminated. Again no-responses and error-responses cannot account for all the difference between responses to easy and hard syntactic structures.

CHAPTER V

SUMMARY, INTERPRETATION AND CONCLUSIONS, LIMITATIONS, IMPLICATIONS, SUGGESTIONS FOR FURTHER RESEARCH, AND CONCLUDING STATEMENT

I. SUMMARY OF THE PROCEDURE

The purposes of this study were, to compare the comprehensibility of a number of syntactic structures, to compare the verbatimness of responses of good and poor comprehenders, and to compare the verbatimness of responses elicited by questions to syntactically hard and easy sentences embedded in continuous prose.

The comprehensibility of the syntactic structures was measured by cloze tests on eight passages in which easy and hard syntactic structures that preserved meaning were embedded. The Verbatimness Test, based on the same eight passages, was used to measure the verbatimness of comprehension answers of good and poor comprehenders. This same test was used to measure the verbatimness of comprehension answers to hard and easy sentences embedded in continuous prose.

A sample of 96 Grade Four students, all of whom had word identification levels at least at grade level, participated in Part I of this study. This group was randomly divided into two groups (X and Z) and then further subdivided into five subgroups. Each subgroup was administered one of the five cloze forms of four passages. The five subgroups of X received cloze tests on Passages A_1, B_2, C_1 and D_2, while the five subgroups of Z received cloze tests on Passages A_2, B_1, C_2 and D_1. The "mean cloze sentence scores" on the pairs of sentences which had different syntactic structures but preserved meaning were compared. As well, the individual passage scores on the cloze tests were used to rank the students of group X in order of their comprehension ability. The top 14 and bottom 14 students from group X were chosen for Part II of the study. The same procedure was followed for group Z.

In Part II of the study, the students were administered the Verbatimness Test. Each student read a passage using the Reading Tutor machine and answered two wh-questions on a passage. The students in groups PX and GX read Passages A_1, B_2, C_1 and D_2, while groups GZ and PZ read the remaining four passages. Answers were scored with respect to their degree of verbatimness. The "mean verbatimness scores" of the good comprehenders and poor comprehenders were compared within groups X and Z. As well, the "mean verbatimness scores of answers to sentences hard to comprehend were compared to the "mean verbatimness scores" of answers to sentences easy to comprehend.

The findings, interpretation of findings and conclusions are outlined in the following section.

II. FINDINGS, INTERPRETATION, AND CONCLUSIONS

The null hypotheses, outlined in Chapter One, are restated below. The findings and conclusions are then stated followed by an interpretative discussion of the findings and conclusions.

HYPOTHESIS I

There is no significant difference between the "mean cloze sentence scores" of the two sentences of a sentence pair.

This hypothesis was rejected for three of the sentence pairs used in this study which did show significant differences between means. These three pairs were, the nominalization vs active verb, the verb + complement vs the reflexive-intensive, and the embedded clause vs the right branching clause with the former of each pair being significantly more difficult than the latter.

For eight of the sentence pairs used in this study, the hypothesis cannot be rejected. These eight pairs were, the ing nominalization of purpose vs the infinitive of purpose, the embedded clause vs the right branching clause of Passage A_1 and A_2, the adverb deletion vs the adverb clause, the two adjective vs relative clause comparisons, the wh + s as object vs the reflexive-intensive, the intact vs the contraction and the nominalization vs the active verb of Passage B_1 and B_2.

Discussion Of the three sentence pairs which proved significantly different, two of the pairs differed in the same direction as was found by other researchers.

In Passages A_1 and A_2, the nominalization of an active verb structure was found to be more difficult than the active verb structure. Coleman (1965, 1966), and Coleman and Blumenfeld (1963) obtained the same results. However, the difference between the nominalization and active verb sentences of Passages B_1 and B_2

was not significant, and the direction of difference was opposite to the nominalization vs active verb finding in Passage A_1 and A_2 and opposite to the findings of the other researchers. This was in spite of the fact, that in both pairs of passages, the paired sentences occurred very near to the beginning of the passage, and almost the exact syntactic structures existed across sentence pairs. Furthermore, what preceding context that did exist before the paired sentences would have provided more information for the comprehension of the sentence pair in Passage A_1 and A_2 than the sentence pair in Passage B_1 and B_2. Therefore, context redundancy would have to be ruled out as an explanation for the difference in results between the two pairs of sentences. The differences in structure between the two pairs of sentences were too slight to have accounted for the change in direction. Therefore, the only variable left unaccounted for or uncontrolled was the actual lexical items in the sentences themselves. It is possible that given different lexical items, syntactic differences will be reduced or exaggerated. Whatever the cause, it would appear that the nominalization of an active verb structure will not always be more difficult than the active verb structure.

The other sentence pair which reached a significant level of difference and which agreed with the results of other researchers was the right-branching clause structure vs the embedded clause structure of Passage D_1 and D_2. Coleman (1966), Schlesinger (1968) and Foss and Cairns (1970) found as well that embedded structures were more difficult to comprehend than the right branching form. However, the embedded vs right branching comparison of Passage A_1 and A_2 was found to have a difference too small to reach significance. Furthermore, the difference was in the opposite direction to that of the results of other researchers, and in the opposite direction to the results of the embedded vs right branching sentence pair in Passage D_1 and D_2. The sentence pair of Passage D_1 and D_2, which reached significance, was very near the beginning of the passages, whereas the sentence pair of Passage A_1 and A_2 occurred nearer to the middle of the passages. Thus,the amount of contextual redundancy afforded to the embedded-right branching sentence pair of Passage A_1 and A_2 may have been greater, thus reducing the difficulty of the embedded structure. Since, almost the exact syntactic structures were used across these sentence pairs, this factor should not account for the difference in results obtained by these sentence pairs. Again one must face the conclusion that embedded clause sentences will not always be more difficult than right-branching clause sentences, and that contextual redundancy may interact with the particular syntactic structure to decrease the difficulty.

Finally, the one sentence pair which reached a significant level of difference and which went in the opposite direction to the results of other researchers was the reflexive-intensive vs the verb + complement of Passages C_1 and C_2. In this case, the reflexive-intensive structure was easier to comprehend than the verb + complement structure. Fagan (1969) found the reverse to be true.

There are a number of possible reasons to explain the difference in direction between the reflexive-intensive results of this study and those of Fagan's. Firstly, Fagan's definition of a verb + complement is not completely clear and the verb + complement structure used in this study may have been much more difficult than the verb + complement used in Fagan's study. This may explain the difference in direction between the two sets of results. As well, the verb + complement used in this study involved the addition of a negative which should have increased the difficulty of the verb + complement. (Mehler, 1963; Savin & Perchonock, 1965; Greenberg, 1970; Michekazu, 1972). Finally, it should be pointed out that one of the original assumptions made about syntactic changes within the sentence pairs used in this study was that the syntactic changes within pairs did not change meaning. A stricter examination of the verb + complement vs reflexive-intensive comparison of Passages C_1 and C_2 shows that in these sentences, meaning likely did change. While both sentences state that "the bird felt sorry", and both sentences are exactly the same to this point, the succeeding part of each sentence is different in meaning. In the reflexive-intensive sentence - "The bird felt sorry for itself." - the succeeding part of the sentence tells for whom the bird felt sorry. One could obtain this information from Passage C_1 only by inference. In the verb + complement sentence - "The bird felt sorry that it could not fly." - the succeeding part of the sentence tells why the bird felt sorry. This information could be obtained from Passage C_2

only by inference. The critical variable here is inference. The members of the sentence pair differed in what could be inferred and what was stated explicitly. This change in meaning may have confounded the syntactic results. The mean difference between the reflexive-intensive and the verb + complement may not have been due to syntactic differences but due to differences in meaning. Therefore the finding that a reflexive-intensive structure was easier to comprehend than a verb + complement structure can only be accepted with some reservation.

A number of the sentence pairs which did not reach significant levels of difference maintained the same direction of difference as was found by other researchers. Fagan (1969) found contractions more difficult than their intact form as did this study. As well, Fagan (1969) and Pearson (1974) found that relative clauses were more difficult to comprehend than adjectives as did this study in the first adjective-relative clause comparison of Passage A_1 and A_2. Finally, Fagan (1969) found that reflexive-intensives were more difficult to comprehend than wh + s as object. This study found the same direction of difference. However, as with the reflexive-intensive vs verb + complement, the reflexive-intensive vs wh + s as object comparison was not well controlled for meaning. Thus, the direction of difference between the reflexive-intensive and wh + s as object can only be accepted with reservation.

The two pairs of sentences with mean differences so small that no direction could be assumed were, the infinitive of purpose vs the ing nominalization of purpose and the second adjective vs relative clause comparison of Passage A_1 and A_2. Fagan (1969) found the ing nominalization of purpose to be more difficult than the infinitive of purpose. Since this comparison in this study was strictly controlled for meaning, and the ing nominalization of purpose vs the infinitive of purpose may not have been as strictly controlled for meaning in Fagan's study, this researcher concludes that the ing nominalization of purpose is not more difficult than the infinitive of purpose. With respect to the second adjective vs relative clause comparison, one would have expected a greater difference here, since the lexical insertion for this adjective and relative clause was more difficult than the lexical insertion for the first adjective and relative clause comparison. Again, the increased amount of context before the second adjective-relative clause pair may have reduced the impact of the difficulty of the relative clause.

Finally, the adverb replacement deletion vs the adverb clause comparison, which showed the adverb clause to be more difficult, was not as expected. Fagan (1969) had found that an adverb replacement deletion was more difficult than an adverb position shift.

To facilitate the following discussion on the adverbials, the sentences in question are presented below.

PASSAGE A_1 "He went to play with his new dog after he took the things home."

PASSAGE A_2 "After that he went to play with his new dog."

In this study the adverb replacement deletion of Passage A_2 was compared to an adverb clause which had not been front shifted.

It was felt that the absence of the front shifting should, if anything, make the adverb clause of Passage A_1 easier. However, the choice of location of the adverb clause and the adverb replacement deletion was unfortunate for the adverb clause. In the Passage A_1, the adverb clause comes in the first sentence of a new paragraph and in this context, the adverb clause functions as a semantic bridge between the two paragraphs. The adverb clause repeats part of the preceding sentence thus acting as a semantic bridge. However, when the adverb clause normally has this function, it is usually front shifted. The adverb replacement deletion functions in the same way (as a semantic bridge) as the adverb clause. But the adverb replacement deletion had been front shifted and thus was in its normal context. The fact that the adverb clause was not front shifted into its normal context may have caused it to be more difficult than the adverb replacement deletion. Therefore, the difference in difficulty between the two sentences may have been due to a contextual factor rather than a syntactic factor.

Several tentative conclusions can be made at this point. While three syntactic comparisons were found to be significantly different in their comprehensibility, it was also found that two of these syntactic comparisons using different lexical insertions and different contexts were not significantly different. Therefore, it would appear evident that contextual and lexical factors may override the syntactic factors which cause difficulty.

In terms of context, it would appear that syntactic factors are most pronounced when they occur early in a passage. This conclusion is supported by the finding that only sentence pairs occurring early in a passage reached acceptable levels of significance while the same syntactic comparisons occurring later in a passage did not reach an acceptable level of significance. This conclusion must be tempered however, by the fact that all sentence pairs occurring near the beginning of a passage did not reach acceptable levels of difference.

Another contextual factor which may override syntactic factors, can be found in the adverb clause vs adverb replacement deletion comparison. In this comparison, the disruption of the normal juxtaposition of sentences and clauses may have caused one sentence to become more difficult. The failure to maintain normal patterns between sentences could be a more powerful factor in causing comprehension difficulty than syntax.

While it has been suggested that particular lexical items may interact with particular syntactic structures to increase or decrease sentence difficulty, no effort was made to establish which lexical variables may have been operating.

HYPOTHESIS II

There is no significant difference between "mean verbatimness scores" of the poor comprehenders and the "mean verbatimness scores" of the good comprehenders:

1. When all-responses are scored. For groups GX and PX this

hypothesis was rejected for Passage D_2 where the difference between means reached the .05 level of significance. The direction of difference in this passage indicated that good comprehenders answered more verbatimly than the poor comprehenders. On the other three passages administered to GX and PX, the difference in means did not reach an acceptable level of significance. The hypothesis could not be rejected for these passages. However, the direction of difference between means in all three of these passages showed good comprehenders to be producing more verbatimness in their answers.

For groups GZ and PZ, the null hypothesis may be rejected for Passage B_1 where the difference between means was significant at the .05 level. The direction of the difference between means showed good comprehenders to be producing more verbatimness in their answers. For the other three passages, the mean differences did not reach acceptable significance levels and therefore the hypothesis could not be rejected. The direction of difference between means of good and poor comprehenders on two of these passages showed that good comprehenders produced more verbatimness than poor comprehenders. The remaining passage countered the above mentioned trend and showed that poor comprehenders produced more verbatimness in their answers.

Discussion. The results reported above **tentatively indicate that**, when all-responses are considered, good comprehenders answered in a more verbatim fashion than poor comprehenders. On only one of the eight passages did the results tend in the opposite direction.

2. When no-responses are eliminated. For groups GX and PX

the null hypothesis is rejected for Passage D_2. The direction of the difference between the means indicated that the good comprehenders answered more verbatimly when they answered. The nonsignificant difference between means on the other three passages demands that the null hypothesis not be rejected for these passages. However, the direction of difference between means on these passages continued to show good comprehenders as producing more verbatimness in their answers when they answered.

For groups GZ and PZ the null hypothesis must be rejected for all passages as no significant differences remained when no-responses were eliminated from the data. However, on three of the four passages, the direction of the difference between means showed the good comprehenders to have produced more verbatimness in their answers than poor comprehenders. Only one difference showed the poor comprehenders as having produced more verbatimness.

Discussion It would appear that when good and poor comprehenders did answer, the good comprehenders still answered with more verbatimness than the poor comprehenders. On seven of the eight passages, the direction of difference between means supported this conclusion. However, it appears that with no-responses eliminated, the strength of the difference between means was slightly reduced, suggesting that the unequal proportion of no-responses which existed in some of the cells had a small effect on the results.

3. When no-responses and error-responses are eliminated. For groups GX and PX the null hypothesis cannot be rejected for any of

the passages. None of the mean differences between groups reached a significant level of difference. However, in all passages, the direction of difference between means of groups GX and PX showed the good comprehenders as having produced more verbatimness than poor comprehenders when only correct-responses were considered.

For groups GZ and PZ the null hypothesis again cannot be rejected for any passage. None of the mean differences between groups reached a significant level of difference. However, on three of the four passages, the direction of the difference between means of groups GZ and PZ showed the good comprehenders as having produced more verbatimness than good comprehenders. On only one passage was this direction reversed.

Discussion. Again, seven out of eight passages showed that the good comprehenders produced more verbatimness than the poor comprehenders when only correct-responses were considered. However, as no-responses and error-responses were eliminated, the size of the difference decreased. Thus, if one compares the answers of good comprehenders to poor comprehenders when their answers were correct, then it is evident that the difference was quite small but stable.

In order to explain these results, one must first consider the task. To ensure that as many correct-responses were obtained as possible, two procedures were carried out. Firstly, the subjects were shown the questions beforehand. Because the children were given the questions beforehand, they had only to concentrate upon two sentences and only one at a time. Secondly, they were asked for their answer to the question almost immediately after the offset of the target sentence. The reasons for these steps were explained in Chapter III. However, the result of these steps could very well have resulted in a memory task in which a short term verbatim storage strategy could have been used without too much difficulty. The norms for grade four aged children provided by the Detroit Tests of Learning Aptitude (Test 13)(Baker & Leland, 1967) suggest that the sentences used in this study, were well within the short term verbatim memory range of the average grade four child. Thus, the sentences could have been stored in a fairly verbatim manner without too much effort. Furthermore, since the answers were called for very soon after the offset of the target sentence, the subjects could not have been penalized by the negative effects of a sharp loss over time when storage is verbatim. Thus, verbatim storage could easily have handled the task.

That the students did store the sentences in a verbatim way can be seen by the "mean verbatim scores". Few of the scores drop below the 50% level. It should be pointed out that the scoring method exacted a heavy penalty for even small changes from the target sentence. Thus only a few words changed could seriously reduce the score. Furthermore, it was not possible using this scoring method for any student to get a perfect score, even when his answer was word for word identical to the target sentence. Thus, the verbatim scores were depressed more than the actual answer might indicate. Finally, when 70% of the correct-responses, randomly sampled, were scored to determine the percentage ratio of nouns, verbs, pronouns, adjectives and adverbs recalled verbatim to the nouns, verbs, pronouns, adjectives and adverbs substituted, it was found that only 9% of these categories were actual substitutions suggesting that the answers exemplified a high degree of verbatimness.

Up to this point in this discussion, the researcher has suggested that the target sentences could have been stored using a verbatim storage strategy, and that there is evidence to suggest that subjects were using this strategy. There is one more source which would suggest that a verbatim storage strategy may have been used. Smirnov (1973) suggests that young school age children respond in a verbatim form when the information to be learned is contained in a relatively short selection (1973, p. 46). Since the unit to be responded to in this study was quite small, then Smirnov's observation of Soviet children may be just as applicable to the children in the sample used in this study.

Finally, the scoring method used in this study is similar to the scoring systems used in other studies of short-term recall. Tests such as the (Related Syllables Test) of the _Detroit Tests of Learning Aptitude_, and the various digits tests, all use some measure of _verbatimness_ in recall.

Given that the task in the Verbatimness Test is not much more than a short-term recall task requiring less storage capacity than that required by other short-term recall tests, and given that the scoring system used in this study is similar to the scoring systems of other short-term recall tests, the results are perfectly explicable by the results of other studies which have compared good and poor comprehenders in terms of the comprehender's short-term memory capacities. This study had attempted to investigate why differences existed between good and poor comprehenders in terms of memory span obtained on short-term recall tests. However, since the task in this study was only another form of a short-term recall task, then the findings that good comprehenders answer more verbatimly than poor comprehenders only replicates those findings of Raymond (1952), Alwitt (1963), Rodgers (1966), Todd & Kessler (1971) and Khemlani (1974). No findings as to why good comprehenders have a greater memory span have been obtained. The only finding of any consequence is that, given a task in paragraph comprehension similar to the one used in the Verbatimness Test, then we should expect answers to be of a highly verbatim nature.

HYPOTHESIS III

There is no significant difference between the "mean verbatim scores" obtained by subjects responding to easy syntactic sentences and the "mean verbatim scores" obtained by subjects responding to hard syntactic sentences:

1. When all-responses are scored. This hypothesis can be rejected for Passages A_1 vs A_2 where the difference between means reached the .05 level. The direction of difference on this passage pair showed that answers to a hard syntactic sentence were more verbatim than answers to an easy syntactic sentence.

This hypothesis can also be rejected for Passages C_1 vs C_2

where the difference between means reached the .01 level of significance. The direction of difference on this passage pair countered the direction of difference of the first passage pair showing that the answers to an easy syntactic sentence were more verbatim than the answers to a hard syntactic sentence.

This hypothesis cannot be rejected for the remaining two passage pairs since the difference between their means did not reach an acceptable level of significance. Of these two passage pairs, the difference between means of Passages D_1 vs D_2 was too small to predict any direction. On the remaining passage pair, Passages B_1 vs B_2, the direction of the difference between means suggested that answers to a hard syntactic sentence were more verbatim than answers to an easy syntactic sentence.

Discussion With all-responses considered there is no clear trend in verbatimness of answers to easy or hard syntactic sentences. Thus, at this level, it would appear that sentence difficulty may or may not affect which storage strategy is used to store the sentence.

1. When no-responses are eliminated. The null hypothesis must be rejected for Passages A_1 vs A_2 where the difference between means reached the .05 level of significance. The direction of difference between means in this pair suggested that answers to a hard syntactic sentence were more verbatim than answers to an easy syntactic sentence.

The null hypothesis must also be rejected for Passages C_1 vs

C_2 where the difference between means reached the .05 level of significance. The direction of difference between means in this pair suggested that answers to a hard syntactic sentence were more verbatim than answers to an easy syntactic sentence.

The null hypothesis must also be rejected for Passages C_1 vs C_2 where the difference between means reached the .01 level. The direction of difference between means ran counter to the above mentioned direction and suggested that answers to an easy syntactic sentence were more verbatim.

The null hypothesis cannot be rejected for the remaining passage pairs as the differences between means did not reach an acceptable level of significance. The direction of difference between the means of Passages B_1 vs B_2 suggested that a hard syntactic sentence elicited more verbatimness in answers, while the difference between the means of Passages D_1 vs D_2 was too small to predict any direction.

Discussion In considering the answers of children to hard and easy syntactic sentences when the children did respond, again, a a fairly confused picture emerged. There was little real change when the no-responses were eliminated from the data. When the children do answer then, sentence difficulty may or may not increase the degree of verbatimness in answers.

3. When no-responses and error-responses are eliminated. The null hypothesis can be rejected for Passages A_1 vs A_2 where the difference between means reached the .01 level of significance. The direction of difference between means suggested that a hard syntactic

sentence elicited more verbatimness.

The null hypothesis can be rejected for Passages C_1 vs C_2 where the difference between means reached the .01 level of significance. The direction of difference between means however, countered the direction of difference found in Passages A_1 vs A_2. In Passages C_1 vs C_2 the direction of difference between means suggested that an easy syntactic sentence elicited more verbatimness in answers than a hard syntactic sentence.

The null hypothesis cannot be rejected for the remaining two passages. However, the direction of difference between the means of sentences within the passage pairs suggested that, a hard syntactic sentence elicited more verbatimness in answers than did an easy syntactic sentence.

Discussion The findings when only correct-responses were considered were still somewhat contradictory. However, a trend was being established. Three of the four passage pairs pointed to hard syntactic sentences as eliciting more verbatimness in answers while only one passage pair pointed in the opposite direction. Furthermore Passage C_1 and C_2 on the reliability measure of the Verbatimness Test produced an extremely low reliability score which leads one to suspect the results on one or both of these passages. As well the reflexive-intensive sentence of Passage C_2 was substantially shorter than the verb + complement sentence of C_1 which may have accounted for some of the difference in verbatimness of recall between the two sentences. Given that the results of Passages

C_1 and C_2 may be unreliable and confounded by sentence length, then the other passages begin to take on more prominence. And the results of the other three passage pairs all tended to show that sentences with hard syntactic structures elicit more verbatimness in answers when only correct-responses are considered. Therefore, a suggestion exists that when only correct-responses are considered (when the target question and sentence are understood), the syntactic difficulty of the sentence does affect the degree of verbatimness in comprehension responses. It would also appear evident that no-responses and error-responses were obscuring this affect.

It may be that sentence difficulty is affected by the storage strategies used in sentence storage and can be explained in terms of an analysis of sentence storage. If a sentence is to be stored correctly in a reorganized and more compact unit, then some comprehension of the stimulus sentence must occur. In order for this sentence comprehension to occur, some analysis of the syntactic relations within a sentence will be required. If the syntactic structure of a sentence proves too difficult to analyse, then a full comprehension of the stimulus sentence may prove impossible. In this case, it may be too great an effort to reorganize the information contained in the stimulus sentence in a more compact unit. There are then two alternatives at this point. The reader could either pass over the sentence or use a more verbatim strategy. The verbatim strategy could be successful where the stimulus task falls within the limits of verbatim memory. In terms of this study, it has already been pointed out that the task involved in the Verbatimness Test could have been handled fairly easily by a verbatim storage strategy. As well, the student would not likely pass over the target sentence since he knew an answer was expected on the target sentence. Therefore, given that some sentences (the hard syntactic sentences) would have been more difficult to reorganize in a more compact form, one should have expected more verbatimness in the answers to the harder syntactic sentences. This is what the main trend of findings on correct-responses shows.

Again it should be emphasized that the chunking storage strategy and verbatimness storage strategy might best be considered as the ends of a continuum. As such, then difficult syntactic structures would appear to force readers to move farther along towards the verbatimness storage end of the continuum. This effect has only been demonstrated however, for a comprehension task in which answers were generally of a highly verbatim nature.

III. LIMITATIONS

During the study it became evident that, the following limitations could reduce the generalizability of the findings.

1. The task involved in the verbatimness test must be considered as one which short-term verbatim memory could have handled easily. Therefore the verbatimness results of this study are not likely generalizable to larger tasks than short-term verbatim memory is capable of handling.

2. The fact that the reliability of Passage C_1 and C_2 of the Verbatimness Test was very low as measured by a test-retest procedure, reduces the confidence one may have in the findings which were produced by these passages on the Verbatimness Test.

3. This study assumed that the sentences within the sentence pairs had different syntactic structures but the same meaning. However, it would appear that this assumption is untenable for the sentence pair verb + complement vs reflexive-intensive of Passages C_1 and C_2, and sentence pair wh + s as object vs reflexive-intensive of Passages A_1 and A_2. Therefore, the difference in comprehensibility between these sentences may not be due to syntactic differences.

4. Since Passages B_1 and B_2 did not have members of a sentence pair which were significantly different, then the findings of Hypothesis III which resulted from Passages B_1 and B_2 can only be accepted with reservation.

IV. IMPLICATIONS FOR EDUCATION

The following implications result from the findings of this study.

1. The suggestion has been made to avoid certain syntactic structures in print material (Coleman, 1965; Schlesinger, 1968). However, it would appear that the finding, that certain syntactic structures are not always more difficult than certain other syntactic structures (ie. embedded clauses vs right branching clauses), may limit this suggestion. Rather than avoid these structures completely,

it may be wiser to avoid them only in certain contexts or when certain lexical variables are operating. However, since the specific lexical and contextual variables have not as yet been identified, it may be wise to continue to heed the warning to avoid certain syntactic structures until such time as the pertinent contextual and lexical variables are identified.

2. Given that some syntactic structures are more difficult to comprehend than others, then classroom instruction should attempt to alleviate this problem through systematic instruction.

3. The finding, that most students responding on the Verbatimness Test were responding in a highly verbatim way and, that this likely resulted from the fact that the questions referred to only one sentence and that only two questions were presented before the reading of the passage, has certain implications for classroom teaching practise. Guszak (1968), in an analysis of teacher questioning strategies, found that questions similar to the ones used in this study comprised over half of all comprehension questions asked during reading comprehension lessons. If the results of this study are generalizable to the same classroom situations which Guszak studied, then it would appear that many classrooms are creating situations where a short-term verbatim recall strategy may be sufficient to satisfy the teacher's demands. This situation would hardly be conducive to the development of more of a chunking strategy. It would seem reasonable that questions which involved more than one sentence of a passage would be more productive in terms of devel-

oping a chunking storage strategy.

V. SUGGESTIONS FOR FURTHER RESEARCH

The findings of this study give rise to a number of problems which might be further investigated.

1. It was found in this study that certain syntactic structures were not always more difficult to comprehend than certain other syntactic structures (ie. the nominalization of an active verb vs the active verb structure). Contextual and lexical factors may have overpowered or interacted with the syntactic factors to change the relative difficulty of certain syntactic structures. Specifically, investigations might be conducted to explore the following areas:

   i) To what extent do lexical variables affect the relative difficulty of certain syntactic structures.

   ii) To what extent does preceding context reduce the difficulty of certain syntactic structures.

   iii) To what extent does the disruption of "normal" paragraph construction create difficulty in comprehending certain syntactic structures.

2. This study, as one of its purposes, had attempted to investigate the differences between good and poor comprehenders in terms of memory strategies. Specifically, it tried to demonstrate, that poor comprehenders were using a more verbatim storage strategy

in paragraph comprehension while good comprehenders were using more of a chunking strategy. However, it was found that the Verbatimness Test was a poor instrument for investigating this hypothesis. A further investigation of this hypothesis might attempt to direct the subjects' attention to larger segments of a passage and require recall on these larger segments.

3. The finding that ~~sentence~~ difficulty may affect the storage strategies used in sentence storage requires further replication. While manipulation of syntactic structures was used in this study in order to produce the above mentioned finding, it may also be possible to manipulate lexical difficulty to obtain the same finding. This notion requires investigation.

VI. CONCLUDING STATEMENT

This study has identified a number of syntactic structures which are relatively more difficult than others. It has also produced evidence suggesting that contextual and lexical factors may also play a role in relative syntactic difficulty.

In terms of investigating whether good comprehenders use more of a chunking storage strategy than do poor comprehenders, this study found that a short-term recall task was not a productive research method. It was suggested that, directing the subjects' attention to larger segments of a passage would be a more productive method.

However, the same short-term recall task did produce evidence which suggests that different storage strategies may be used for recall of hard and easy syntactic sentences embedded in prose passages. The hard syntactic sentences elicited more verbatimness suggesting that, sentences which are difficult to comprehend may be less amenable to a chunking storage strategy.

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APPENDIX A

SAMPLE OF INSTRUCTIONS FOR CLOZE TESTS AND SAMPLE CLOZE TESTS

SAMPLE OF INSTRUCTIONS FOR ADMINISTRATION OF CLOZE TESTS

"On the board is an example of the kind of work we will do today."

(The following story was printed on the blackboard)

The man opened the __________ to his house. A __________ jumped out. The cat __________ down the street and __________ the corner.

"I took some of the words out of this story. Each space shows where I took one word out. I want you to read the story and try to guess what word makes sense in each space."

(Students were allowed one minute to read the story.)

"Now raise your hand if you know what word makes sense in the first space."

(One child was selected to respond to the first space. If his response was correct then his response was printed in the space by the researcher. If his response was incorrect then a second child was asked to respond. This was continued until a correct response was elicited.)

"Now raise your hand if you know what word makes sense in the second space."

(Children were selected to respond until a correct response was elicited. The correct response was printed in the second space.)

(When all spaces were correctly filled the following instructions were given.)

"You are going to do four stories which have words taken out of them just as they were taken out of this story. You are to print or write the word in the space that makes sense in the sentence. Remember, you may put only one word in each space. If you get stuck on any one space, leave it, and come back to it when you finish filling in the rest of the spaces. If you cannot read a word, put your hand up and I will come over and tell you the word. If your are not sure of the correct spelling of a word, just spell it the best you can. Are there any questions?"

"I am going to give you your stories now. They are in these envelopes. Please don't open the envelopes until I ask you to."

(The envelopes were then distributed to the appropriate student).

"Turn the envelope so that you are looking at your name and your name is upside-down. Now reach into the envelope and take out the top page. Put your name on the top of that page."

"Remember you can only put one word in each space. If you cannot read a word,put your hand up and I will tell you the word. If you don't know the spelling for a word, just spell it the way you think it might be."

"Are there any questions?"

"You may begin now."

(When twelve minutes had elapsed from the beginning of the cloze test, the following instructions were given.)

"Stop. Turn your page over and put it at the top of the desk. Turn the envelope so that you are looking at your name and your name is upside-down. Now reach into the envelope and take out the top page. Put your name on the top of that page."

"You may begin now."

(Twelve minutes were allowed for each of the four cloze tests administered.)

SAMPLE CLOZE TESTS

A_1(2)

George __________ a new dog for __________ birthday. He decided to __________ a doghouse. When he __________ the doghouse, it will __________ a lot of work.

__________ went to the store __________ buy some nails. The __________ were needed to make __________ doghouse. The boy bought __________ paint that would cover __________ doghouse. George took the __________ home.

He went to __________ with his new dog __________ he took the things __________. He did not build __________ doghouse. George's father came __________ and asked if the __________ was finished. George felt __________. He was not proud __________ what he had done.

__________ looked at the panting __________. "I will build the __________ tomorrow for sure," said __________.

A_1(3)

George got __________ new dog for his __________. He decided to build __________ doghouse. When he builds __________ doghouse, it will take __________ lot of work.

He __________ to the store to __________ some nails. The nails __________ needed to make the __________. The boy bought the __________ that would cover the __________. George took the things __________.

He went to play __________ his new dog after __________ took the things home. __________ did not build the __________. George's father came home __________ asked if the doghouse __________ finished. George felt foolish. __________ was not proud of __________ he had done.

George __________ at the panting dog. "__________ will build the doghouse __________ for sure," said George.

APPENDIX B

SAMPLE OF THE INSTRUCTIONS, PASSAGES AND QUESTIONS[1] OF THE VERBATIMNESS TEST

SAMPLE OF INSTRUCTIONS FOR ADMINISTRATION OF THE VERBATIMNESS TEST

"Today you will read the same stories as you read the last time I was here. Only this time, all the words will be in the story."

"I will put the story into this machine."

(Put the demonstration story into the machine)

"When I turn this knob, the story will start to turn through the machine. You will only be able to read part of the story - the part that you can see through this window."

(Turn the machine on and allow the student to read the demonstration story.)

(Ask the student to tell what the demonstration story was about in order to determine whether the student was able to read the demonstration story.)

"Now you are going to read four stories. Before you read a story, I will show you two questions. I will read the questions to you. Then I will turn the machine on and you can begin reading to yourself to find the answer to those questions. At a certain place in the story, I will stop the machine. I will ask you one of the questions and you are to tell me the answer to the question in a sentence. After you have given your answer, I will start the machine again and you can begin reading again. At another place in the story I will stop the machine again. Then I will ask you the other question and you are to tell me the answer to that question in a sentence."

"Are there any questions?"

"Let's begin."

(Put the designated passage into the Reading Tutor. Show the questions for that passage to the student and read the questions to him. Then start the Reading Tutor. When the sentence to which the target question refers has passed from view, stop the machine and repeat the target question. Transcribe the student's response on the Verbatimness Response Sheet. Then start the Reading Tutor again. Stop the Reading Tutor when the sentence to which the dummy question refers, passes from view. Repeat the dummy question. Transcribe the student's response to the dummy question. Take the passage from the Reading Tutor and insert the second passage. Proceed with this passage in the same manner as was done with the first passage.)

SAMPLE OF PASSAGES AND QUESTIONS USED IN THE VERBATIMNESS TEST

Presented in this appendix are the eight passages used for the Verbatimness Test. These same passages were used for the cloze test. The sentence underlined with a solid line in each passage is the target sentence. The sentence underlined with the dotted line is the dummy sentence. The passages when presented to the subjects had no underlining or questions on the page.

Below the passages are the target question and dummy question for that passage. During the administration of the Verbatimness Test these questions did not appear on the passage itself but on separate cards.

PASSAGE A_1

George got a new dog for his birthday. He decided to build a doghouse. When he builds the doghouse, it will take a lot of work.

He went to the store to buy some nails. The nails were needed to make the doghouse. The boy bought the paint that would cover the doghouse. George took the things home.

He went to play with his new dog after he took the things home. He did not build the doghouse. George's father came home and asked if the doghouse was finished. George felt foolish. He was not proud of what he had done.

George looked at the panting dog. "I will build the doghouse tomorrow for sure," said George.

TARGET QUESTION: What will take a lot of work?

DUMMY QUESTION: George said what?

PASSAGE A_2

George got a new dog for his birthday. He decided to build a doghouse. His building of the doghouse will take a lot of work.

He went to the store to buy some nails. The nails were needed for making the doghouse. The paint that the boy bought would cover the doghouse. George took the things home.

After that, he went to play with his new dog. He did not build the house which was for the dog. George's father came home and asked if the doghouse was finished. George felt foolish. He was not proud of himself.

George looked at the dog which was panting. "I'll build the doghouse tomorrow for sure," said George.

TARGET QUESTION: What will take a lot of work?

DUMMY QUESTION: George said what?

PASSAGE B_1

The girls started at the very back of the orchard, deciding that it would be more fun to work toward the house than away from it.

When the sun rises in the sky it will make the job harder.

"We can play we're going to find the Promised Land," said Sarah, "The house and the barn will be the Promised Land."

"And the prune picking will be the troubles we go through," agreed Linda from the next row. Her face was quite red, but she was bravely keeping up with Sarah. Both girls were making the leaves fly as they shook each tree for whatever fruit might still be hanging to its branches.

TARGET QUESTION: What will make the job harder?

DUMMY QUESTION: Her face was what?

PASSAGE B_2

The girls started at the very back of the orchard, deciding that it would be more fun to work toward the house than away from it.

The rising of the sun in the sky will make the job harder.

"We can play we're going to find the Promised Land," said Sarah. "The house and the barn will be the Promised Land."

"And the prune picking will be the troubles we go through," agreed Linda from the next row. Her face was quite red, but she was bravely keeping up with Sarah. Both girls were making the leaves fly as they shook each tree for whatever fruit might still be hanging to its branches.

TARGET QUESTION: What will make the job harder?

DUMMY QUESTION: Her face was what?

PASSAGE C_1

By the end of October, the bird was more lively, though his wing was not strong enough yet for him to fly very far.

The bird felt sorry that it could not fly.

You had better keep him in the cage," Mr. Johnson advised. "Chirp would have a hard time in the ice and snow this winter."

Chirp probably was comfortable but he did not look happy. For hours at a time he huddled in one corner.

"You want to go south, don't you Chirp?" Pat asked. "I wish I could help you."

Then all of a sudden Pat thought of a way he could help. When he told June his plan, she was as excited as her brother.

TARGET QUESTION: The bird felt how?

DUMMY QUESTION: Chirp would have a hard time when?

PASSAGE C$_2$

By the end of October, the bird was more lively, though his wing was not strong enough yet for him to fly very far.

The bird felt sorry for itself.

You had better keep him in the cage," Mr. Johnson advised. "Chirp would have a hard time in the ice and snow this winter."

Chirp probably was comfortable but he did not look happy. For hours at a time he huddled in one corner.

"You want to go south, don't you Chirp?" Pat asked. "I wish I could help you."

Then all of a sudden Pat thought of a way he could help. When he told June his plan, she was as excited as her brother.

TARGET QUESTION: The bird felt how?

DUMMY QUESTION: Chirp would have a hard time when?

N

PASSAGE D_1

A huge grizzly bear sat perfectly still in a shallow stream. His eyes were fixed on the water swirling about his forepaws.

The sun was melting the silver frost that was very thick.

The bear ate many kinds of food, but he chose only what he considered the tastiest. Of all the foods that he ate, the bear liked fish the best. Because he had roamed the wilderness for so long, he knew when the trout chose to swim upriver to another pool. He knew also that they passed through the stream right where he was sitting. It was their highway between two pools.

A large trout swam toward him.

TARGET QUESTION: What was very thick?

DUMMY QUESTION: It was their highway between what?

PASSAGE D_2

A huge grizzly bear sat perfectly still in a shallow stream. His eyes were fixed on the water swirling about his forepaws.

The silver frost that the sun was melting was very thick.

The bear ate many kinds of food, but he chose only what he considered the tastiest. Of all the foods that he ate, the bear liked fish the best. Because he had roamed the wilderness for so long, he knew when the trout chose to swim upriver to another pool. He knew also that they passed through the stream right where he was sitting. It was their highway between two pools.

A large trout swam toward him.

TARGET QUESTION: What was very thick?

DUMMY QUESTION: It was their highway between what?

APPENDIX C

SAMPLE OF INSTRUCTIONS FOR _THE GRADED WORD LIST_ TEST AND A SAMPLE OF THE TEST

SAMPLE OF INSTRUCTIONS FOR ADMINISTRATION OF THE GRADED WORD LIST

"I want you to read these lists of words. Start here (point to List I) and read the words in this list."

(When the student completes List I, the student should be told to read List II and so on until he reaches his ceiling list level)

(The ceiling level is the first list in which the student makes more than two errores)

(Any mispronounciation, substitution or omission is counted as an error. If a child takes longer than five seconds to pronounce a word, then that word is also counted as an error.)

(The list that preceeds the ceiling level list designates the list level at which the child can easily pronounce words. Using Table C_1 below, the list level can be converted to a grade level.)

TABLE C_1.

GRADE EQUIVALENTS FOR THE GRADED WORD LIST

LIST NUMBER	1	2	3	4	5	6	7	8	9	10	11	12	13
GRADE LEVEL	PP	P	1	2	3	4	5	6	7	8	9	10	11

SAMPLE OF THE GRADED WORD LIST TEST

1

see
play
me
at
run
go
and
lock
can
here

2

you
come
not
with
jump
help
is
work
are
this

3

road
live
thank
when
bigger
how
always
night
spring
today

4

our
please
myself
town
early
send
wide
believe
quietly
carefully

5

city
middle
moment
frightened
exclaimed
several
lonely
drew
since
straight

6

decided
served
amazed
silent
wrecked
improved
certainly
entered
realized
interrupted

7

scanty
certainly
develop
considered
discussed
behaved
splendid
acquainted
escaped
grim

8

bridge
commercial
abolish
trucker
apparatus
elementary
comment
necessity
gallery
relatively

9

amber
dominion
sundry
capillary
impetuous
blight
wrest
enumerate
daunted
condescend

10

capacious
limitation
pretext
intrigue
delusion
immaculate
ascent
acrid
binocular
embankment

11

conscientous
isolation
molecule
ritual
momentous
vulnerable
kinship
conservation
jaunty
inventive

12

zany
jerkin
nausea
gratuitous
linear
inept
legality
aspen
amnesty
barometer

13

galore
rotunda
capitalism
prevaricate
risible
exonerate
superannuate
luxuriate
piebald
crunch

APPENDIX D

EXAMPLES OF SYNTACTIC STRUCTURES EXAMINED IN THIS STUDY

Active Verb: "When he builds the house it will take a lot of work."

Adjective: "George looked at the panting dog."

Adverb Clause: "He went to play with his new dog after he took the things home."

Adverb Replacement Deletion: "After that he went to play with his new dog."

Contraction: "'I'll build the doghouse tomorrow for sure,' said George."

Embedded Clause: "The paint that the boy bought would cover the doghouse."

Infinitive of Purpose: "The nails were needed to make the doghouse."

Ing Nominalization of Purpose: "The nails were needed for making the doghouse."

Intact Form of a Contraction: "'I will build the doghouse tomorrow for sure,' said George."

Nominalization of an Active Verb: "His building of the doghouse will take a lot of work."

Reflexive-Intensive: "The bird felt sorry for itself."

Relative Clause: "George looked at the dog which was panting."

Right Branching Clause: "The boy bought the paint that would cover the doghouse."

Verb + Complement: "The bird felt sorry that it could not fly."

Wh + S as Object: "He was not proud of what he had done."